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CHICAGO, MARCH, 1914.

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FACTS ABOUT STATE OWNERSHIP.

ON PURELY superficial grounds the advocates of government ownership of telephones and telegraphs in this country can hardly be censured for their convictions. A good many things conspire to cast a semblance of reasonableness upon the scheme. And to the lay mind (which classification includes the statesman), the favorable features are much more obvious, viewed at a distance, than the unfavorable ones. The fact that a majority of civilized governments own and operate the wire systems of their countries, for example, is well known. It is not so well known that this majority of governments operate in the aggregate but a minority of the world's telephones. The state ownership advocates have published the fact that rates in some countries are lower than they are here. But they have not mentioned, and perhaps have not realized, that they are making their comparisons on a basis of population—not on a basis of instruments in service. Rates which seem low may prove to be very high. We can, therefore, criticize Congressman Lewis of Maryland, Postmaster-General Burleson and his committee for either withholding two-thirds of the truth of state ownership conditions, or failing to study those conditions sufficiently to know whereof they speak. *All* the evidence, without exception, points to government telephony and telegraphy as a grotesque and sinister travesty upon efficiency and service.

Patriotism, of course, rises to this challenge with the assertion that our government could succeed where all others have failed. We hesitate to cry "impossible" to any untried experiment; but certainly no *avant courier* of such success is evident.

Last month TELEPHONE ENGINEER mentioned that the United States government already operates over 3,600 miles of telegraph and cable lines in Alaska. Even this little state system has been described flatteringly as an argument for further operation. John J. Underwood, who lived in that territory for fourteen years, wrote a book entitled, "Alaska—an Empire in the Making," published last year. He says:

> There is at present one good example of government ownership in Alaska in the telegraph system of the territory, which is operated exclusively by the government. . . . The tolls charged on this system are such as would force a private corporation to keep a hydrant playing on its stock books to keep down the dividends to a point where they would not create a public scandal. . . . Mile for mile, the government charges at least 280 per cent more for service in Alaska than does either of the large companies operating in the United States.
>
> Alaska's ten years' experience with the government telegraphic system has not shown government ownership to be the brilliant success that has been claimed for it. True, the

government has profited, but at a terrific cost to the people who have used the service.

There is no secret in the failure of present government wire systems either to make a profit or to provide any service to their subscribers. Their records are available and must certainly have been inspected by Messrs. Burleson, Lewis, et al. That those gentlemen persist in their propaganda must, therefore, be taken as indicating that they are actuated by purely political motives; that they want, at all costs, the added political power such a condition would bring; and that they have ignored, or carefully concealed, that preponderance of adverse evidence which they could not have avoided seeing.

That government operation of wire systems, and consequent government employment of wire system operators, means a tremendous additional political power is shown by the fact that the employes of telephone and telegraph companies in this country number little short of 200,000. That many of those are women is not reassuring when we consider the progress of the movement for equal suffrage. Combine that with the present list of postal employes, and add the railroad workers of the country, and the result is far greater than the average plurality of winning presidential candidates.

We are beginning in this issue of TELEPHONE ENGINEER a series of three articles, or rather compilations, covering the subject of government ownership of telephones and telegraphs. The first of the series is entitled, "Opinions on Government Ownership," and merely quotes the expressions of authorities on the subject. We have avoided quoting the editorial opinion of any American newspaper or magazine, for reasons sufficiently obvious; and when we have drawn upon the editorial columns of the foreign press, we have selected only comment upon established fact—not mere opinion. Most of our quotations are from students of the subject, men of undoubted erudition, who have given more time to the matter than it would seem possible for Congressman Lewis or Postmaster-General Burleson to have done.

The second article of the series will be entitled, "Finances of Government Ownership," and will show some of the statements of foreign telegraph departments and the amounts of their annual deficit, which, of course, is imposed upon the non-user in the form of taxes. It will be shown that where a rate is actually lower on a basis of service rendered (and there are few such cases, indeed), it is lower because the great mass of the public, user and non-user alike, is taxed to make up the loss.

The third of the series, "The Truth About Government Ownership," will attempt to reveal some of the startling inefficiencies of state operation of wire systems, and their causes—an array of facts which should prove conclusively to every thinking man that satisfactory service under operation by this or any other government is a practical impossibility.

We make no claim to originality in any of the evidence we shall submit. Its value, indeed, lies in the fact that it is already of record. We shall content ourselves with indicating conclusions so obvious that even to point them out is hardly necessary.

CHANCES IN THE TELEPHONE BUSINESS.

POPE said: "I lisped in numbers, for the numbers came." As a race, we of America have been said to lisp in dollars; and, in proportion to our concentration on the subject, the dollars come. We judge and are judged by our incomes. The industry or the job to which we give our waking hours is good or bad as it brings us much or little money. When we are asked: "What are chances in the telephone business?"—or any other business—the question really means, "What are the chances to make big profits, or to draw a big salary?"

This comment is not offered in a cynical vein. On the contrary, we can see nothing wrong with the condition. It is meet and fitting that a man should be rewarded in proportion to the value of his services to society. Under proper conditions income is a measure of service; although perhaps conditions are not always proper. Undoubtedly salary is a truer index of real personal worth than is business profit. And as the vast majority of workers are employes rather than employers, a discussion of salaries is of paramount interest.

A frank and public discussion of specific individuals and their salaries would obviously be considered in bad taste. Inasmuch, however, as the figures we are about to name have already been published, we trust that the *dramatis personae* of the following cast are willing to suffer this additional exploitation for the encouragement and inspiration of those on the lower rungs of the telephone ladder.

These figures became public property when the American Telephone and Telegraph Company reported to the public service commission the names of its officers and employes who receive compensation exceeding $6,000 a year:

Theodore N. Vail, president	$100,000
Edward J. Hall, vice-president	37,500
N. T. Guernsey, associate counsel	33,333
N. C. Kingsbury, vice-president	30,000
G. V. Leverett, general counsel	24,583
J. J. Carty, chief engineer	22,000
C. G. Du Bois, controller	22,000
A. S. Hibbard, relations with telephone companies	20,000
W. R. Driver, treasurer	19,583
G. D. Milne, assistant treasurer	15,000
U. N. Bethell, senior vice-president	15,000
Charles H. Wilson, general superintendent	15,000
C. D. M. Cole, general attorney	13,500
T. D. Lockwood, patent counsel, Boston	12,000
F. A. Pickernell, engineer	12,000
H. B. Thayer, vice-president	12,500
B. Gherardi, engineer of plant	11,000
K. W. Waterson, engineer of traffic	11,000
M. Egleston, counsel	10,000
R. W. Devonshire, assistant treasurer	10,000
C. S. Gleed, executive department, Kansas City	10,000
F. A. Stevenson, general superintendent of plant	9,000
C. R. Bangs, vice-president	9,000
J. A. Barrett, engineer	8,000
J. D. Ellsworth, advertising manager	8,000
M. C. Rorty, commercial engineer	8,400
H. B. Smith, assistant controller	8,000
H. S. Brooks, general commercial superintendent	8,700
F. A. Buttrick, assistant treasurer	7,500
T. B. Doolittle, executive department, Bridgeport	7,500
T. J. Perkins, assistant attorney	7,200
J. L. R. Van Meter, general superintendent of traffic	6,900
J. E. Caldwell, executive department, Nashville, Tenn.	6,666
C. H. Arnolds, engineer	6,600
W. S. Gifford, statistician	6,600
J. H. Peck, assistant to general counsel, Boston	6,600
F. L. Rhodes, engineer	6,300
H. S. Warren, engineer	6,300

There are only thirty-eight in this list. Of these twenty-one get $10,000 or more, and eight get at least $20,000. Of course, a number of the officials also draw salaries from other Bell companies with which they are associated. The list itself, it will be understood, includes only employes of the American Telephone and Telegraph Company, and does not contemplate the payrolls of the Western Electric Company, the Western Union Telegraph Company (until recently a part of the system)

or any of the local Bell operating systems subsidiary to the American Company. Therefore, numerical comparisons on a basis of total number of employes are not pertinent in this case. The inspirational value of the list rests solely in the fact that here are a number of telephone men drawing excellent salaries. The average man —which means the great majority—considers anything over $6,000 an excellent salary.

It happens very frequently that ambitious young men ask our opinion as to the opportunities in the telephone business—purely from the employe's standpoint. Some of them were merely looking for the field of greatest opportunity; some were really enamored of the telephone business, and only wanted assurance that its opportunities were as great as those of the electric light, or street railway, or some other technical line. On such occasions we have given it as our opinion that the opportunities for telephone engineers and executives not only are as great as in any other field of equal size, but that they must inevitably become much greater within the next few years.

Already the telephone has marvelously solved almost impossible problems, and is wrestling with more. Every problem, solved or unsolved, demands additional expert knowledge of the kind that means high salaries. *Every* man who is today in the employment of a telephone company is potentially a candidate for one of those high-salaried positions.

Public utilities are, and must be, wholly practical in their selection of men for responsible places. High salaries are reached by gradual stages, through long educational years of lesser responsibility. There is no royal road to big pay in the telephone or any other business.

No spectacular leap placed any of the thirty-eight on the list printed above. On the other hand, many of them reached that point from a start more humble and unimportant than any in the experience of our readers. Theodore N. Vail, himself, used to be an employe of the United States Railway Mail Service. John J. Carty went to work for the old Telephone Dispatch Company of Boston with no more and no less advantage than any other boy whom it employed. Angus S. Hibbard started in a subordinate position with the Wisconsin Telephone Company. And so on. They did not all begin as office boys or linemen, perhaps; suppose they started where you are now, who read this. That gives you an equal opportunity at the six or ten or twenty thousand a year.

There are not enough ten-thousand-dollar jobs to go around. If there were, you would not have to compete very strenuously with the rest of the world. You would be sure of getting yours anyway. But on the other hand, there are not enough ten-thousand-dollar *men* to go around, either. In other words, all men have the opportunity, and nearly all of them fail to measure up to it. Perhaps that condition fits the telephone business better than most lines of effort.

At any rate, we may be sure there is a splendid and growing opportunity for young men in the telephone field—so much so that the demand is not for opportunity, but for men.

JUSTICE TO ENTERPRISE

John M. Eshleman, president of the Railroad Commission of California, said recently:

"The amount of money wisely invested in a public utility proper is the best evidence of value for rate making purposes and is the controlling element in determining the amount on which a utility should be permitted to earn."

We are of the opinion that time will prove this expression to be one of the wisest and soundest uttered up to this time on the subject of valuations, says *Public Service Regulation.* It appears to be the rapidly crystallizing opinion, not only of Mr. Eshleman and the California commission, but of other state commissions as well. Theories of valuation determination—of which there are many—seem to be all giving way to the simple process of finding out as nearly as possible what money has actually gone into the property, not alone for physical property still in existence, but for all proper purposes.

The existing plants of most large utilities today represent in value nothing like the total amounts which have been spent upon them, including capital invested in apparatus discarded long before it was worn out to keep pace with the progress of invention and demands for modernized service. Estimates of reproduction now, in many cases, fall far short of the cash spent in building up utility properties and serving the people as they desired to be served.

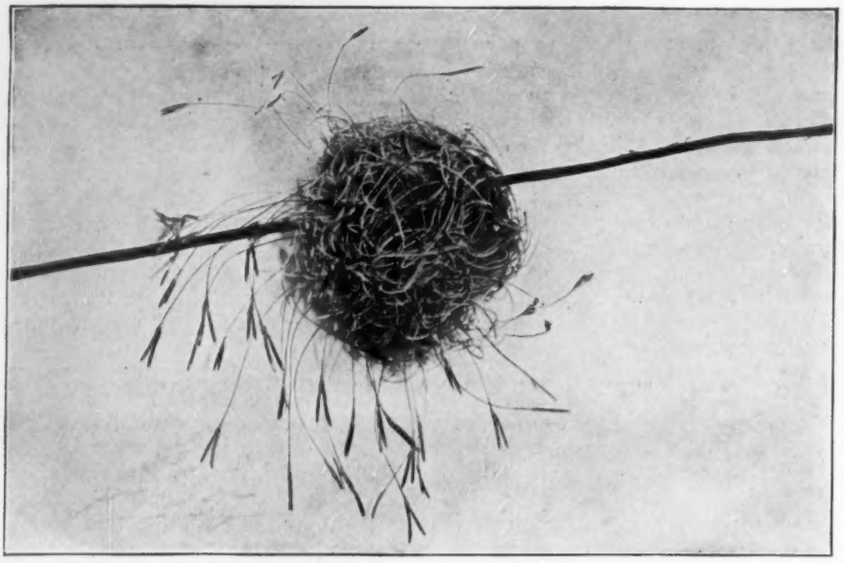
Justice should be done to the enterprising, for it is upon individual enterprise and initiative that progress and prosperity depend."

THE PROPER BASIS FOR RATES

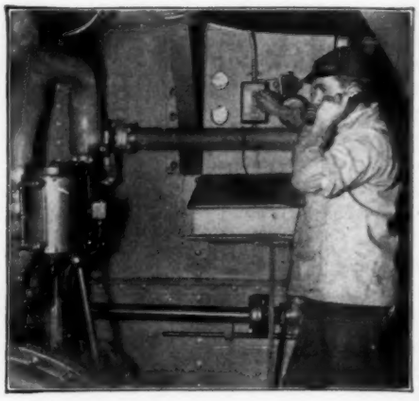
After a careful study of the telephone situation in Lincoln and elsewhere, the Nebraska commission is convinced that the present generally accepted basis of rates and classification contains many inequalities, inconsistencies and discriminations, but the problem is a serious one and the companies and regulating bodies are not yet prepared, excepting in a few of the very largest places in the country, to establish rates that will more equitably distribute between the different classes of users of the telephone the necessary revenue to cover operating expenses and produce a reasonable return on the investment.

The commission is inclined to agree with a number of other commissions which have lately determined that the only truly equitable basis for making rates would be the measure of the service; that is to say, that each subscriber should pay first a fixed or readiness-to-serve charge, which would cover the cost of maintenance, depreciation and taxes, as well as a return to the investor on the amount of plant placed at the subscriber's disposal, and in addition thereto a measure rate which will cover the direct operating expenses incurred in rendering the service needed. In the smaller cities where this scheme has been tried it has not proven entirely satisfactory, because it is clearly shown that the adoption of such a rate schedule has restricted the service, complicated and increased the cost of accounting, and served to cause many irritations which are, as a rule, absent in cities where the flat rate obtains, differentiating only between classes.

The commission is not persuaded that the classification obtaining in its territory sufficiently distinguishes between various users in accordance with even the average amount of service of the classes named, but to re-classify the subscribers will require a long and tedious study, extensive readjustment of plant apparatus and the use of meters not yet perfected. Under all the circumstances the commission feels that it will best serve the purposes and create the least irritation to permit the present classification to stand.



Air Plant Growing on a Telephone Wire in Porto Rico. It Has No Roots and the Seeds Carried by Wind or Birds Attach Themselves to the Wires and Grow to About Five Inches Diameter—Western Electric News.

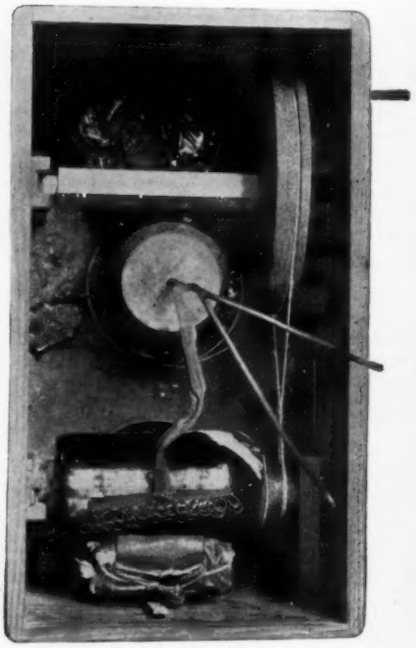


Western Electric Inter-Phone in the Engine Room of the Tug "Perth Amboy."

Ready to Run the Cables at Changsha, China, for the New Exchange.

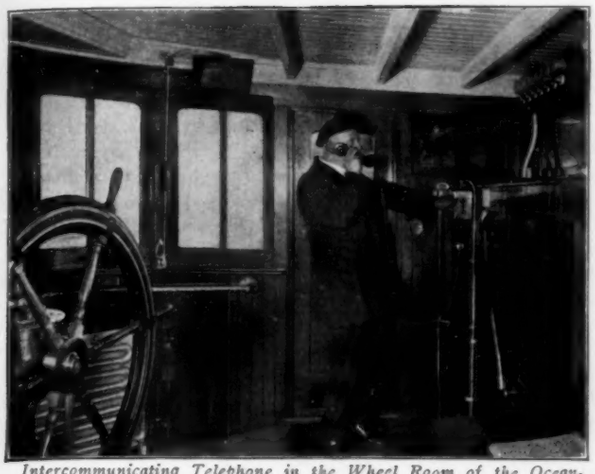
Sliding Chair on Rails Used by the Information Operator of a Big New York Hotel. With Her Card Index and a Long Receiver Cord She Can Get Any Desired Information in a Moment.

Just a Pole Line Across the Wintry Plains of Minnesota. The Anoka Line of the Northwestern Exchange Company, Built in 1904.—American Cross Arms.



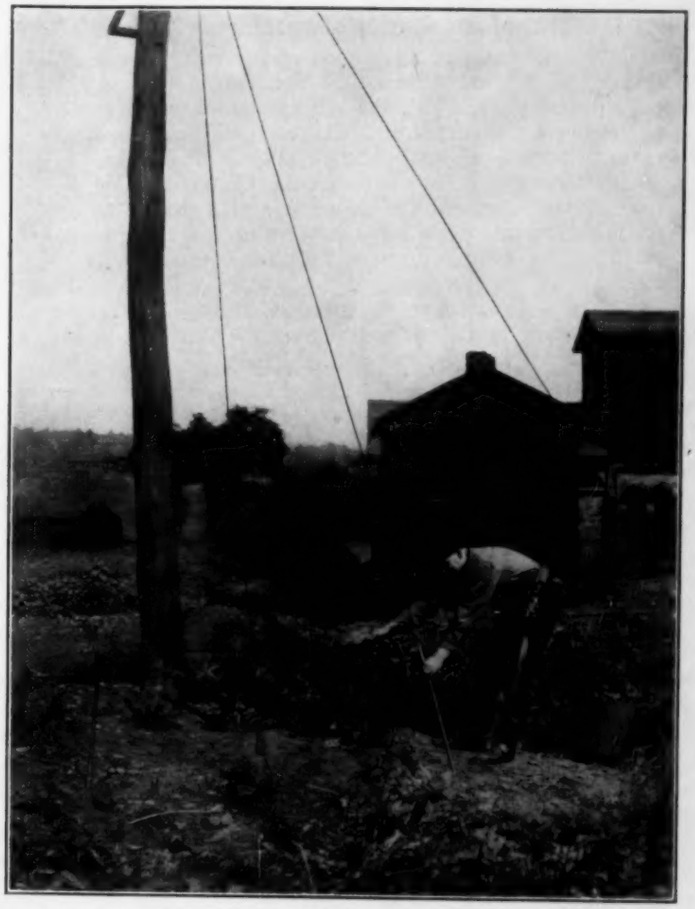
Top View of an Electrical Machine (Frictional) Built by Gennai Hiraga at Tokyo, Japan, About 1750.—Western Electric News.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.



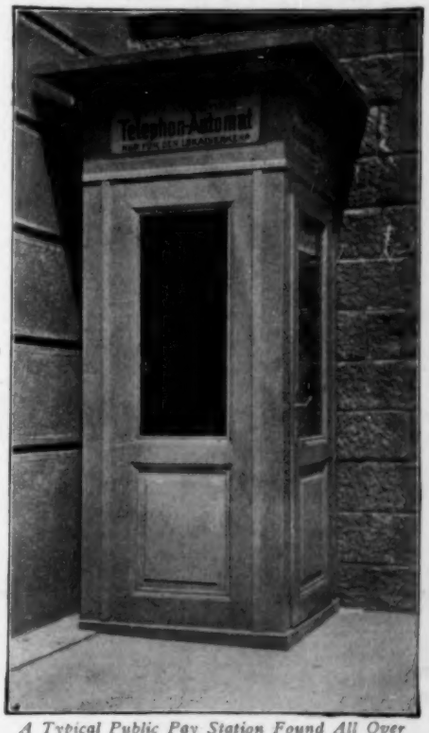
Intercommunicating Telephone in the Wheel Room of the Ocean-Going Tug "Perth Amboy."

New Telephone Exchange Building at Changsha, China. It Will Contain a 3,000-Line Western Electric Common Battery Switchboard Equipped Now for 1,000.



A Well-Guyed Pole. The Lineman Is Tightening a Guy with a Roush Self-Clamping Wire Adjusting Anchor Rod.

Portable Telephone Set Belonging to One of the Automobiles of the Maharajah of Mysore, India. These Sets Are Carried for Emergencies.—Western Electric News.



A Typical Public Pay Station Found All Over Vienna, Austria—Western Electric News.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

National Association's Washington Office

At a meeting of the board of directors of the National Independent Telephone Association, held in Chicago January 31, 1914, the officers and executive committee were instructed to make an investigation of the national telephone situation, especially as it concerned the stipulation entered into between the Department of Justice and the American Telephone and Telegraph Company, and to take such steps as were necessary to further the interests of independent telephony and protect the members of the Association.

Pursuant to those instructions, the proper investigations were made and at a meeting of the executive committee of the Association, held February 16, the following resolutions were adopted:

Whereas, There are a number of national questions before the Independent telephone companies of the country that require careful investigation and wise co-operation before a satisfactory solution can be reached; and

Whereas, Under existing laws practically every telephone company in the United States is under the control of the national government; and

Whereas, The principal purpose of a National Independent Telephone Association should be to look after those matters that are national in their scope and interstate in their legal nature; now therefore,

Be It Resolved, by the Executive Committee of the National Independent Telephone Association that permanent offices should be opened at Washington, D. C., by this association and that the secretary, F. B. MacKinnon, is hereby instructed to proceed immediately to make arrangements for the same and that he shall remain in Washington and devote his time to co-operating with the Department of Justice, the Interstate Commerce Commission, and the other departments at Washington, in working out a solution of the national problems of the Independent telephone companies, and that he shall be prepared at all times to represent the members of this association before the various departments at Washington and to guard impartially the interests of all companies, both large and small, being especially careful to see that no one class of company be permitted to secure an advantage over any other class. It is further

Resolved, That inasmuch as there is needed at this time greater co-operation locally in the form of stronger and more efficient state organizations and that through those organizations can be and should be worked out the problems of more efficient and economical service methods—that service is a local and not a national issue and should be treated as such—that, therefore, the best efforts of the Chicago office of this association shall be devoted to the upbuilding of the state organizations and in this way lend the assistance of the National organization to the individual company in its effort to furnish better service to the subscriber and more certain returns to the stockholder.

Carrying out the instruction given in the foregoing resolution, arrangements were completed for the opening of the Washington office, tentative arrangements having been previously made. This office was ready for occupancy February 25 and Secretary F. B. MacKinnon from that time on will give his entire time and devote his best efforts to representing the independent companies at Washington. All companies are urged to take advantage of this opportunity to secure exact knowledge of conditions and to have their own conditions properly explained.

Wisconsin Association's Annual Meeting

Some 200 telephone men, members of the Wisconsin State Telephone Association, gathered in Madison February 11 to attend the fifth annual convention of that organization held in the Park Hotel.

Addresses were made by C. B. Randall, attorney for the Tri-State Telephone Company of St. Paul on "Contracts and Right of Way"; Fred Runkle of Portage, on "What the Automobile Means to the Telephone Business," and O. E. Rudolph, secretary to the Northern Chemical Engineering Laboratories, on "Proper Care of Batteries."

The tentative rules for telephone service which the state railroad commission formulated as a standard for Wisconsin received a full discussion Thursday afternoon. Commissioners John H. Roemer and David Harlowe presided and John N. Cadby, chief of the telephone engineering staff of the commission, answered questions of the members as each of the thirteen rules was up for discussion. At the close, Chairman Roemer announced that the standards would be carefully reviewed in the light of the suggestions offered, and would not be finally promulgated for some time.

Great interest was shown in the subject of the rights or remedies of telephone companies whose lines are crossed by high tension wires, which cause objectionable noise to telephone patrons. This discussion resulted in adoption of a motion instructing the legislative committee to prepare legislation on this subject.

The discussion, which lasted all afternoon, was not without its lighter vein. Rural telephone men told of lines in their systems having from twenty-four to forty-one patrons each. There was naturally much cross talk, one man with forty-one lines admitted, but he had no complaints because the subscribers would rather endure it than have their rentals raised.

Action was taken looking toward the amendment of the constitution to make the election of directors more democratic and to provide for better representation of smaller companies.

John A. Pratt, president of the Wisconsin State Telephone Association, in his address, said in part that Wisconsin stands at the forefront of the states of the Union in telephony, and praised the state's non-duplication policy and the physical connection law, together with the perfection of the system of uniform accounting, which, he predicted, will gradually bring about a universal service.

He gave these statistics: Total messages transmitted in the United States in 1911, 24,208,000,000, of which 14,400,000,000, or 59.5 per cent were by telephone, 9,700,000,000, or 40.1 per cent, were by mail, and 108,000,000, or 0.4 per cent, were by telegraph.

The following directors were elected for a term of three years: John A. Pratt, Menominee Falls; P. J. Weirich, Monroe, and W. F. Goodrich of La Crosse. After the election the directors met and elected the following officers: President, W. L. Smith, Neillsville; vice-president, J. A. Pratt, Menominee Falls; treasurer, W. F. Goodrich, La Crosse.

Fisher Again President of I. T. A. A.

The board of directors of the Independent Telephone Association of America, meeting February 10, declared E. B. Fisher of Grand Rapids, Mich., elected president in place of B. G. Hubbell, resigned. E. D. Schade of Johnstown, Pa., was also made first vice-president and G. W. Robinson of St. Paul, Minn., second vice-president. Richard Valentine of Janesville, Wis., was re-elected treasurer and W. S. Vivian, Chicago, secretary.

It is stated that Mr. Hubbell's election to the presidency was announced through a misunderstanding of the ballot, and that the election really returned Mr. Fisher to the chair. On learning this, Mr. Hubbell at once graciously resigned the honor.

Opinions on Government Ownership

First of a Series of Three Articles on State Operation of Wire Utilities

BY PAUL H. WOODRUFF

CONGRESSMAN D. J. LEWIS of Maryland wants to have the telephone system of the United States "postalized." That is a euphemism for government ownership and operation under the postoffice department. Mr. Lewis has not introduced such a resolution without argument; indeed, some 35 pages of the Congressional Record are filled with it.

Mr. Lewis estimates by one assumption and another that the valuation of his country's wire system is $900,000,000. For this modest sum he proposes to issue bonds at three per cent. Lest the figure be disputed however, he asks the government to take over the plant at once and let the Interstate Commerce Commission fix its value later.

Like any other congressman or citizen, Mr. Lewis has a right to present argument. It may even be argued that he has a right to present deceptive, fallacious and sophistical argument, providing always that he is willing to face an honest refutation of his claims. But, however complaisantly such a course may be regarded in political circles, it seems obvious that a politician—or, if you prefer, a statesman—who deliberately presents to the public a perverted and deficient statement in the hope and belief that the public will never learn the truth about it must have motives which, to say the least, deserve careful scrutiny.

Congressman Lewis tries to show that the service of the telephone and telegraph companies of this country is inadequate; that rates are unreasonably high as compared with European rates; that European employes of state wire systems are more efficient than American employes of corporation systems; that American systems are over capitalized or extravagantly constructed; and that government wire systems are at least self supporting. We will show, in the course of this series, that all of these assumptions are fallacious and diametrically opposite to the true condition.

It is an easy matter to advance plausible arguments on either side of any complex subject. In confining the first article of this series to opinion only, therefore, the compiler has given primary consideration to the erudition and reliability of those whose views are presented. Editorial expressions of American newspapers are omitted, not from any doubt of their claims to those qualities, but because newspapers are usually political and show representation on both sides of the question. Students of public utility history, however, are practically unanimous in condemning state operation.

Herbert Laws Webb, M. I. E. E., of London, England, is an engineer of international fame who has devoted special attention to the study of telephonic problems. In 1910, when the British government's postoffice department was making preparations to take over the balance of the telephone system of Great Britain, then operated by the National Telephone Company, he published a book on "The Development of the Telephone in Europe." In this space it is impossible for us to review even briefly this excellent work, in which Mr. Webb proves beyond dispute that state owned wire systems are failures. In his conclusion he summarizes the situation clearly:

One cannot write even this brief and imperfect sketch of the history of the telephone in Europe without such a showing of wasted opportunities causing a sensation of the most poignant regret. It has been my lot to observe at frequent intervals during the past fifteen years the working of the telephone service in all its aspects in every European country, and I have even spent some time in arguing over "the telephone question" with the high political authorities of a country where there is at present no telephone service. All my observations and all my studies of the subject, during a continuous connection with telephony in America and in Europe, which now extends to over twenty years, or two-thirds of the whole life of commercial telephony, lead irresistably to the one conclusion—that government monopoly has strangled the telephone in Europe, checked its development, restrained its efficiency, limited its usefulness to the people. Like the Angel of Death, to paraphrase John Bright's famous speech on the Crimean war, the government telegraph monopoly has overshadowed telephone progress throughout the length and breadth of Europe, and killed or maimed every effort made to give the telephone the widespread usefulness to the people of which we know it to be capable.

To compute the loss which the peoples of Europe have suffered, and still daily suffer, through being deprived of the highest possible development of the most rapid means of communication, would be impossible; it is an immense incalculable loss, just as the gain in saving of time and friction which the community blessed with an efficient and highly developed telephone service enjoys is immense and incalculable.

From the experience of America we know that an efficient telephone service, in which the greatest possible rapidity and certainty of communication over both short and long distances is made the governing principle, is capable of almost indefinite expansion—so deeply does this instantaneous means of communication enter into both business and social life. It may be asked—Why should not similar results, similar efficiency and similar development be obtained under government management? The best answer is the results of government management in Europe during the past thirty years. The history of the telephone in Europe clearly shows that the "vested interest" of the government in the telegraphs has been allowed to check the natural advance of the telephone—the progress of the fittest has been artificially restrained. The growth of the brilliant and healthy youngster has been warped and stunted from mistaken regard for the less capable and less efficient elder brother.

Even if under government ownership the management of the telephone were entirely separated from that of the telegraph, so as to eliminate repressive influence, those who are familiar with the conduct of the great government departments, always necessarily subject to political control and political influence, would be the last to claim that a government department can be an efficient substitute for private enterprise in the conduct of an industry where high efficiency, enterprising commercial policy, advanced technical policy, and sound and economical financial management were prime requisites for success. These are all the very antitheses of accepted government methods; and, above all, the outstanding fact that under state management there is no man responsible for financial success or otherwise is sufficient always to prevent really successful and efficient working of a commercial enterprise by government management. Financial soundness in the end governs the whole thing—organization, efficiency, commercial and technical policy—and the difference between the government official and the business man is that the former need only produce accounts while the latter must produce the money. In the world of affairs, of iron and steel, brass and copper, steam and electricity, machinery, organization and effort, it is not love that makes the world go round, but money.

Government ownership may have had, and may still have, some prominent advocates. It is significant, however, that those of our presidents who have gone on record with any utterance on the subject have almost universally disparaged the doctrine. Away back in 1808 Thomas Jefferson concluded:

Having always observed that public works are much less advantageously managed than the same are by private hands, I have thought it better for the public to go to market for whatever it wants which is to be found there, for there competition brings it down to the minimum value.

There is little reason to believe that Jefferson, if he could have lived through the century which has followed his remark, would change his opinion. But if that is a little too ancient history, let us quote Theodore Roosevelt:

We hear much of the question whether the government should take control of the telegraph lines and railways of the country. Before that question can be so much as discussed, it ought to be definitely settled that if the government takes control of either telegraph line or railway it must do it purely to manage it as a business undertaking, and must manage it as a service wholly unconnected with politics. I should like to call the attention of bodies interested in increasing the sphere of state action—interested in giving the state control more and more over railways, over telegraph lines and over other things of the sort—to the fact that the condition precedent upon success is to establish an absolutely non-partisan system. When that point is once settled, we can discuss the advisability of doing what these gentlemen wish, but not before.

The report of the United States postmaster-general advocating the taking over of telephones and telegraphs is, it will be understood, practically an annual affair. For that reason we have made little mention of it so far. It is worth noting, however, that President William Howard Taft offered the following comment on the postoffice report for the year ending June 30, 1911:

I believe that the true principle is that private enterprise should be permitted to carry on such public utilities under due regulations as to rates by proper authorities. This principle I favor because I do not think it in accordance with the best public policy thus greatly to increase the body of public servants.

President Woodrow Wilson, than whom a closer student of government would be hard to find, has also given expression to a very serious and well pondered opinion along the same lines:

Society can by no means afford to allow the use, for private gain and without regulation, of undertakings necessary to its own healthful and efficient operation, and yet of a sort to exclude equality in competition. Experience has proved that the self-interest of those who have controlled such undertakings for private gain is not coincident with the public interest; even enlightened self-interest may often discover means of illicit pecuniary advantage in unjust discriminations between individuals in the use of such instrumentalities. But the proposition that the government should control such dominating organizations of capital may by no means be wrested to mean, by any necessary implication, that the government should itself administer those instrumentalities of economic action, which cannot be used except as monopolies. In such cases, as Sir T. H. Farrar says, "there are two great alternatives, (1) ownership and management by private enterprise and capital under regulation by the state, (2) ownership and management by government central or local." Government regulation may in most cases suffice. Indeed, such are the difficulties in the way of establishing and maintaing careful business management on the part of the government that control ought to be preferred to direct administration in as many cases as possible,—in every case in which control without administration can be made effective.

Mr. Wilson's statement is all the more striking in that he is evidently by no means opposed to the theory of government ownership. Indeed, we seem almost to read between the lines that he would favor such a condition *if it were possible,* and that he regrets, perhaps, that it is obviously *not* possible!

When Justice Charles Evan Hughes was governor of New York, he gave utterance to this significant statement:

Our government is based on the principles of individualism and not those of socialism. . . . We do not seek to multiply the activities of government so as to bring about vexatious interference with liberty or to restrict legitimate enterprise. We deprecate all unnecessary governmental action. But our individualism does not justify unbridled license. Its aims may demand, and frequently do demand, the intervention of government with necessary restrictions and regulations, not to curtail the liberty of the people, but to protect it.

The regulation of public utilities by commissions is in itself a government function, but one still permitting the attainment of efficiency through the encouragement of private ambition. A court decision emphasizing the regulative functions of the public service commission of the state of Washington expresses this sentiment clearly:

In its search for remedies, and while seriously considering municipal, state or government ownership, the public, by reference to the police power of the state, has almost unwittingly—unwittingly in the sense that it is not generally appreciated—solved the problem, and has by the application of fundamental as well as established relative propositions of law, gained every advantage of ownership without assuming its burdens. . . . The benefit of ownership is enjoyed, while its dangers—not the least of which is the political activities of great armies of public employes—are no longer a menace to those who, to avoid the hazards of public ownership, have unwillingly entered upon a policy of public control.

One of the world's greatest street railway experts, James Dalrymple of Glasgow, Scotland, visited this country in 1906 to study American public utilities. Before he went home he was forced to the following conclusion:

I came to this country a believer in public ownership. What I have seen here, and I have studied the situation carefully, makes me realize that private ownership under proper conditions is far best for the citizens of American cities.

"The Principles of Political Economy," by J. R. McCulloch, published in 1864, says in Chapter 9, Part 1:

Perhaps, with the single exception of the conveyance of letters there is no branch of industry which government had not better leave to be conducted by individuals.

* * * * * * * * *

It cannot, however, be too strongly impressed upon those in authority, that non-interference should be the leading principle of their policy, and interference the exception only; that in all ordinary cases individuals should be left to shape their conduct according to their own judgment and discretion; and that no interference should ever be made on any speculative or doubtful grounds, but only when its necessity is apparent, or when it can be clearly made out that it will be productive of *public* advantage.

"Railroad Transportation," by Arthur T. Hadley, LL. D., president of Yale University, published in 1885, says in Chapter 13:

Government ownership of the telegraph prevailed in Continental Europe, because each country was more or less of a bureaucracy; that is, the civil service governed the country, and was so well organized that it extended itself as a matter of course. In America the civil servcie is not so well organized, does not govern the country, and is not allowed to extend itself as a matter of course. Political reasons decided the question in favor of a government telegraph in Europe. Political reasons form the main ground against a government telegraph in the United States.

"Public Finance," by W. M. Daniels, of the Department of Political Economy, Princeton University, and member of the Board of Public Utility Commissioners of New Jersey, published in 1899, says in Chapter 10, Part 2:

If we are to make use of analogy as a guide in such matters, the experiment which deserves our most careful study is the English experiment with the telegraphs. Here was a nation whose industrial habits were most nearly like our own. Here was an industry whose acquisition cost far less than the railroads, and whose administration was immensely simpler. Moreover, conservative financial opinion had pronounced in favor of the experiment. So careful a student as Jevons had concluded that state telegraphs would be successful largely for the same reasons which had made the state management of the post successful. It was found, however, that the economies secured by unity of management were offset by the higher salaries paid to employes, and that the government had to obtain monopoly for the state telegraph, though formerly such an intention had been disclaimed. The financial failure of the experiment is hardly in question. A successful pressure of the telegraph personnel for higher pay, and an invincible demand by the public for lower rates, proved to be the upper and nether millstones between which the financial success of the undertaking was ground to powder.

"The Problem of Monopoly," by J. B. Clark, professor of Political Economy at Columbia University, published in 1904, says in Chapter 6:

The difference (*i. e.*, in public benefits) between a thorough system of governmental regulation and a system of governmental ownership is by no means as wide as it appears; and what difference there is, is in favor of the regulated private ownership. Such ownership, if unregulated, has little to commend it. . . . We would better make a thorough test of the alternative plan and adjourn the question of public ownership till the plan of public control shall have been proved a failure.

* * * * * * * * *

That it is wise, before resorting to government ownership, to experiment with regulation more earnestly and judiciously than we have ever done, is sufficiently clear.

"The History of the British Postoffice," by J. C. Hemmeon, Ph. D., published under the direction of the Department of Economics, as Volume VII of the Harvard Economic Studies, in January, 1912, says in its preface:

The consideration of such debatable subjects as the telegraph system of the Postal Department and the department's attitude toward the telephone companies, as well as the intention of the Post Office to acquire the business of the latter, must necessarily give rise to controversy. Thanks to the magnificent net revenue obtained from letters in the United Kingdom, the department has been able to lose a good deal of money by the extension of its activities into the realm of affairs not purely postal. Possibly a *democratic* type of government should, from the financial point of view, interfere least in the direct management of economic institutions, on account of the pressure which can easily be brought to bear upon it for the extension of such institutions on other than economic grounds. If non-economic principles are to be substituted in justifying the initiation or increase of government ownership, a popular form of government seems the least suitable for the presentation of such as shall be fair to all concerned, not to mention the difficult problem of dealing with those members of the civil service who do not hesitate to make use of their political power to enforce their demands upon the government.

Dr. Jacob Gould Schurman, president of Cornell University, in an article on "Socialism," published February 25, 1912, says:

The most that any government has ever done is to provide honest and efficient officials for the conduct of public business along lines already established and by the use of methods and agencies already familiar in private business. Creative epochs in industry are the work of individuals, not of governments.

An article on "The Problem of Securing Efficiency in Municipal Labor," by Benjamin F. Welton, engineer in charge of the Bureau of Efficiency, Office of the Commissioner of Accounts, New York City, published in the annals of the American Academy of Political and Social Science, May, 1912, says:

Of all the factors which are not within the control of an administrative official, there is perhaps no single one which militates more seriously against municipal efficiency than the effect of political influence on the discipline of a labor force. When any employe, be he laborer, foreman or superintendent, is in a position to do as he pleases and snap his fingers in the face of his superior officer if rebuked, the efficiency of the entire force to which he may be assigned is gone. It is no uncommon occurrence for a foreman to suspend a laborer, request his discharge, and then be instructed to reinstate him and "leave him alone." After such a performance how can it be expected that the foreman can compel the obedience of the remainder of his force?

The appointment and retention of incompetent and undesirable employes can generally be traced to political influence. The uncertainty of tenure in the higher positions, due also to this reason, has a direct effect on the efficiency of all subordinate forces. The employment of labor greatly in excess of actual needs may be ascribed to the same cause. Especially is this true in respect to foreman and assistant foreman.

"The Price of Inefficiency," by Frank Koester, published in 1913, says in its introduction:

The government, which includes not only the ever changing federal administration, and its legislative and judicial branches, and the governments of the states as well, are as open to criticism as the most outrageous of the trusts. The ensemble governments of the United States, in their mountebank struggle with conditions, passed some 44,000 laws in 1910.

In the words of ex-Governor Herrick of Ohio, there were:

"Laws to regulate everybody and everything except the public expenditures of the lawmakers themselves and of the various departments of the government. The great majority of men sitting in our legislative bodies are lawyers, whose natural tendency is to attempt to remedy every ill by a statute.

"The oversight of business enterprises by the government has placed on the government pay rolls a vast number of officials; it has necessitated the establishment of new departments, the keeping of a mass of records and the compilation of a great quantity of statistics. All this has been done with no serious attempt to reform the antiquated expensive methods prevailing in all departments of the government.

"The people have been so intent on placing the corporations under governmental control that they have overlooked the additional burden they are putting on their own shoulders by placing this work in the hands of officials who, handicapped by bad methods, are rendered powerless to do little more than swell the payrolls.

"It goes without saying that predatory corporations either should be brought within the law or put out of business. It is doubtless true that salutary laws have been passed regulating other corporations, but we should also apply ourselves, as a condition precedent to the government's further controlling and managing these corporations, to reforming the administration of the government. Otherwise the burdens of taxation will become unbearable, intolerable, and in the reaction which will surely follow, much of the good of the progressive legislation of recent years will be undone."

The great majority of the 44,000 laws referred to will undoubtedly be dead letters in a short time, if they ever have any effect. As dead letters they only serve to clog the administration of justice and encourage disrespect for the law. Any one of them, however, may be utilized at any moment as a means of creating confusion for political effect, as has been the case with the Sherman law.

An article by Jonathan Bourns, Jr., ex-United States senator from Oregon, published in the *Saturday Evening Post*, February 8, 1913, says:

And in urging the granting of national appropriations people generally overlook the important fact that every new public enterprise undertaken by the government means an increase in the number of national employes, the adoption of a system of public work more expensive than if undertaken by private enterprise, and—last but not least—the building up of what may easily become a dangerous federal political machine.

Every time we add a new department or a new bureau to the federal government, every time we enlarge the scope of any federal activity, every time we give increased power to federal officers, we add to the magnitude and potency of the federal political machine and relatively diminish the importance and influence and power of the several states. Yet there is no community in the United States, however strong its advocacy of states rights and the retention of power in local hands, but will ask for the assignment of a federal official to assume supervisory control of some of the public work in that immediate locality. The unfounded assumption that in securing federal aid they are getting something for nothing leads people to urge the adoption of a policy that will increase the power of the general government and decrease the power of the several states.

"Public Finance," by F. C. Bastable, professor of Political Economy at the University of Dublin, Ireland, published in 1903, says in Chapter 3, Book 2:

The telegraph as a state business forms a natural appendage to the postal system. It is generally connected with it, owing to the resemblance of the work to be done. There are, however, serious differences. Unlike the letter-post, telegraphic work has been successfully carried on by companies, and international telegraphy is still largely in their hands. The capital expenditure is much greater in the case of telegraphs, and therefore leaves room for that tendency of official bodies to confuse capital and revenue, which we have already noticed (a grave oversight was committed with regard to the English telegraph account, by which £800,000 was spent without sanction) and which is so detrimental to sound finance. Not only is the original cost of establishment or of the purchase of pre-existing rights comparatively speaking large, but incessant renewals and extensions are required in order to meet wear and supply new demands. The saving by unity of management is, besides, not so great, and the cost of transmission forms a larger proportion of the expense, which increases with increased work more rapidly than in the letter-post.

All the circumstances suggest that state telegraphy is not likely to prove financially successful, and such is apparently the result shown by experience. The intermingling of postal and telegraph business makes it hard to establish this proposition, but where a strict separation is kept up the telegraph balance is generally on the wrong side. The English state system has suffered financially, first from the excessive purchase money given to the companies who held the business, and secondly through the pressure on Parliament for lower rates, as shown in the adoption of six-penny telegrams.

If full power to regulate its rates on economic principles be given to the department, there seems to be no reason why it should not at least meet expenses, including interest on capital, or perhaps give a small surplus, sufficient to clear off the first charges in a series of years. Behind the fiscal question there remains the more difficult one of the effect of state management on the development of improvements. To retard the progress of an essential modern auxiliary to commerce for the sake of adding a sum to each side of the national budget is not a desirable achievement. The dealings of state agencies with new inventions are the worst blot on public administration, and it seems that there is this risk in the state telegraphs, that though they are quite up to the standard at their inception, they almost insensibly fall behind as it advances with growing knowledge. This consideration belongs to economic policy rather than finance, which, however suffers from any hindrance to commercial expansion and is certainly not likely to gain by state telegraphy.

The opinion of one who has actually been active in the service of a government which operates its own telephones is interesting. M. Jules Roche, member of French Parliamentary Postoffice Committee, and Minister of Posts in 1890, in reference to the telephone service in France, said in the *Bulletin de l'Association des Abonnés au Téléphone*, for December, 1912:

It is unbelievable, but nevertheless true, that the postoffice administration does not know just how much revenue the telephone service brings in. Some say 30 millions (francs), others say much less than that, and still others believe that it costs more than it brings in. However, in spite of the common use of the offices, and the co-existence of the telephone and telegraph services, the introduction of a "compte morale" would only affect the expenditures. The receipts are already known. But the state has a poor head for business; it knows neither how to buy, nor how to sell. It conducts its business very differently from the man who has put his capital into some enterprise and, wishing it to prosper, does not seek to disillusion himself about the financial return. This is the case not only in the telephone service, but in the majority of state monopolies.

The telephone service should be left to private industry, because the state has to submit to too many influences other than the needs of the public. It is too live and important an undertaking to be ever fully developed by governmental sloth. In Switzerland and Germany, institutions and customs are different from ours; you must not take foreign examples and believe that methods that have met with success there will, without further change, meet with success here.

Here is a striking example. The administration cannot secure workmen for the construction of its lines, unless it employs apprentices, because it does not pay enough. Skilled workmen prefer to find more remunerative employment.

But all this will have to come to an end. France is a wonderful country, and our genius and spirit of initiative must be allowed to develop. Some day all this will change. The state should confine itself to governing; it has enough to do if it occupies itself strictly with what concerns it, and does not seek to carry on enterprises which are not within its rightful sphere.

There are many phases to the question of government ownership, and many more statements by great and "near-great" which might readily be made to qualify under our classification of "opinions." There are also on record any number of anecdotes, ranging from grave to gay, giving isolated but poignant examples of the inadequacy, procrastination, insolence, indifference and downright worthlessness of the government operated telephone. There are others showing the subjection, discouragement and general mistreatment of the state employe and his consequent disgruntlement, lack of ambition, and slip-shod habit. But the really significant specimens among these may be better used later, as "The Truth About Government Ownership."

As to opinions pure and simple, we have already over-burdened our space and our readers. Those who, after studying this compilation still differ with its premises, may contend that an equal number of expressions in favor of government ownership might readily be compiled. No doubt that is true; but if any attempt such a compilation, we will ask merely that they give proper and due consideration to the reputation for learning and judicial thought of those from whom they quote. Any subject upon which all minds are in accord must indeed be simple; for even the spheroidity of earth and the law of gravitation are disputed by some. Debates are frequently decided on the superior adroitness of the debater only, and by the logic actually advanced rather than by the potential logic behind either side which might have been advanced, but was not. Serious questions cannot be so decided. Where we are dependent for a decision on opinion only, the weight of finality rests upon the eminence of him who utters the opinion. That there is a preponderance of such opinion against government ownership of telephones and telegraphs, is certain.

But we have more than even the opinions of the authorities we have quoted on which to rest our case. Exhibits in the form of actual performance records are at our disposal; and if there be any who, after studying them, still insist that government operation can be made as efficient as private operation, we fear we must credit their persistence to some motive other than the public welfare.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE problem of increasing the strength of feeble alternating currents has been engaging engineers and physicists a long time, and has led to numerous inventions, some of them successful, many of them failures. The latest addition to this field is illustrated in Fig. 1 and has as its originator Robert von Lieben, who started from the idea of using the cathode rays produced by an oxide cathode for his gas discharge relay. Three electrodes (a cathode and two anodes), are placed in a high-vacuum glass tube. The current supplies needed for heating the cathode are marked in the figure as z_1 and z_2. The cathod k consists of a refractory body heated by electricity, which has been given the form of a concave mirror. The surface of this concave mirror cathode k, facing the metal body f, is coated with a thin layer of a metal oxide, containing CaO, BaO, etc. If the negative potential of the current source b is connected to the concave mirror cathode k, which has been heated by the battery b_1, the cathode will send out cathode rays, which intersect at one focus. As is seen this focus coincides with the opening o of the Faraday hollow cylinder f. Through this opening the rays reach the inner hollow cylinder f_1. Both cylinders are co-axial, are insulated from each other, and connected to the outside by means of the wires z_3 and z_4. As the diagram shows, z_3 with the aid of a proper resistance w, leads direct, and z_4 with the use of the proper instrument, as telephone, arc lamp, etc., to the positive pole of the current source.

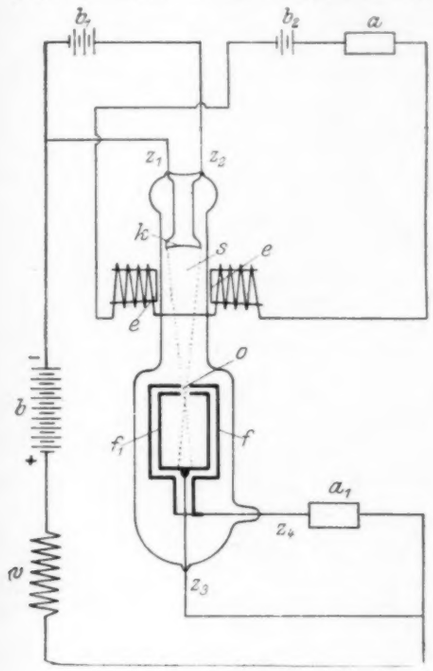


Fig. 1. Liebens Current Relay.

If now the cathode ray pencil s is influenced by the slight variations, caused by the apparatus a, microphone, selenium cell, etc., of the current circuit belonging to the current source b_2, in a magnetic or electrostatic way, then the focus will change its position relative to the opening of the Faraday cylinder f depending on the variations caused. These movements of the focus have the effect that the cathode rays penetrate more or less into the inner cylinder f_1, and thus cause current changes in apparatus a_1.

These currents, whose strength depends on the current in the discharge pipe, can act either direct or through a transformer upon the telephone instrument a_1. Experiments with this apparatus resulted in remarkable success, for strengthened alternating currents were produced that could not be felt in even the most sensitive telephone instrument, and these currents were used to strengthen the a. c. of the telephone exchange, thereby increasing the clearness of sound transmission to a large extent. The apparatus shows several advantages over earlier types. It can be used for a. c. of even the highest frequency, as the cathode rays can follow the changes of the primary current fields without inertia. It is also comparatively easy to set the instrument for the maximum sensitiveness where it remains constant for a longer period of time. Nevertheless there are disadvantages that were not eliminated in this form. The difficulty in making the concave mirror cathode, the irregular emission of the cathode rays at the heated oxide surface, and especially the difficulty to keep the vacuum in the discharge space constant were reasons that urged Lieben to try another form of apparatus.

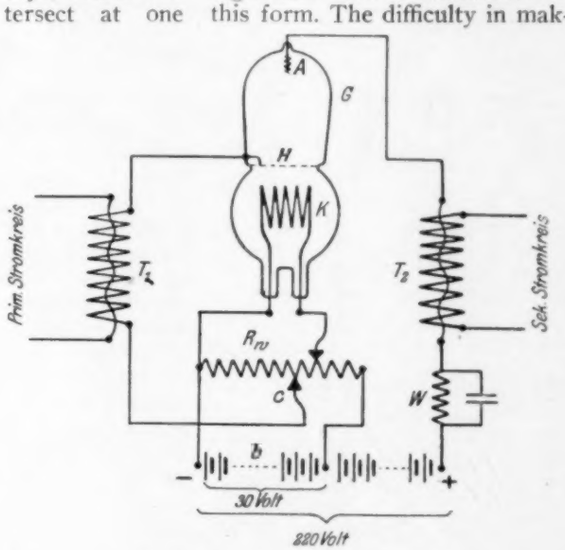


Fig. 2. Improved Lieber Current Relay.

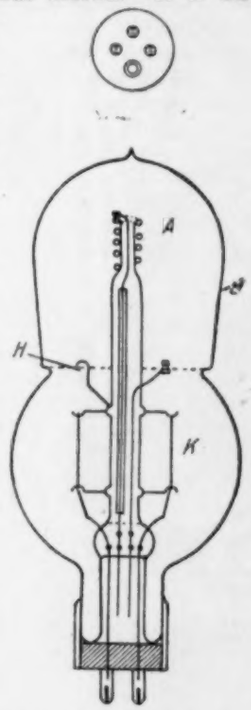


Fig. 3. A. E. G. Current Relay.

The electrons passing from the cathode into space, split the gas molecules into positive and negative ions. As long as a gas is not ionized it can produce no electric current; it acts like an insulator. If we bring into the path of the electrons a metal disc, the latter will be charged negatively by the absorption of electrons, and will retard the electrons coming towards it in such a way that the gas near this disc cannot ionize any further. A sort of dark space forms around this disc. Through the absorption of the electrons, and the retardation of their speed, the

loss in voltage in the discharge tube is increased; in other words, the current strength is reduced. If the disc extends over the entire cross section of the tube, and if there are openings with small cross section for the passing of the current in the direction of the anode, the voltage loss of the discharge tube is very high, since the larger proportion of electrons is absorbed by the metal surface, and for the ionization of the gases we have only the few electrons passing through the openings in the disc. The cross section and the size of the openings determine the fall in voltage.

A measure for the magnitude of this loss in tension is the height of the dark space above the disc. The greater the loss in voltage, the further will the dark space extend toward the anode. If a potential is passed to the metal disc from the outside, the fall in tension in the tube can be varied. With increasing difference of potential between cathode and disc, the speed of the electrons flowing towards the disc and the number of free ions in the openings increase, since the charge effected by the absorption of the cathode rays near the disc is decreased. The disc (which hereafter will be called auxiliary plate) acts as a Faraday net for the electrostatic lines of force going out from the anode, i. e., the majority of the lines of force will penetrate into the metal surfaces of the auxiliary plate, and only a few stray lines of force will take their path to the cathode through the openings in the auxiliary plate. These stray or leakage lines are the denser in proportion as the potential of the auxiliary

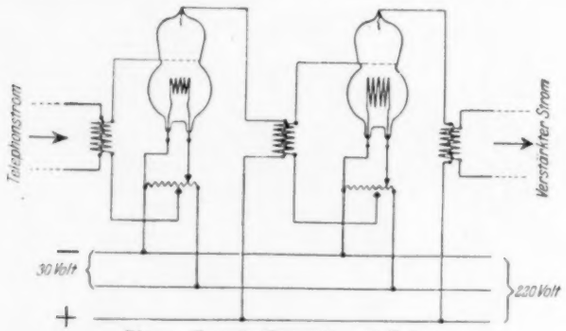


Fig. 4. Cascade Connection of Relays.

plate approaches the anode, and the greater the ionization, i. e., the conductivity of the gas in the openings of the auxiliary plate, becomes. As this ionization increases with greater density of the leakage field, and thus increases the stray lines of force still further, a slight change of the potential of the auxiliary plate results in great changes of the current of the gas ions. This dependance between the tension of the auxiliary plate and the values of the gas-current lead to the construction of a gas discharge relay, which surpasses all previous attempts in point of simplicity and sensitiveness.

The principle is the following: The tension changes of the primary currents are related directly or inductively to the tension of the auxiliary plate, the voltage of the auxiliary plate being first placed at a value sensitive to the anode current. The magnetic deviation of electrons is omitted entirely. There is no necessity for the construction of a concave mirror cathode, since the relay direction is not dependent on the direction of the electrons. The gas pressure in the discharge space chosen can be much greater, as the absorbing effect of the gas molecules for the electrons increases the number of ions, and with it the sensitiveness of the apparatus. Fig. 2 shows the arrangement of the new apparatus.

G is the vacuum glass vessel, in which are the three electrodes, cathode *K*, auxiliary plate *H*, and anode *A*. The auxiliary plate extends over the entire cross section of the tube, and allows passing of current between the main electrodes through small openings in the plate. The electrodes are connected to the main current source *B*, which is d. c. The Wehnelt cathode *K* consists of a zigzag shaped platinum ribbon wound on a glass support, which is coated with a thin layer of barium and calcium oxide. This cathode is heated to a red heat of 1,000 degrees by means of a 30 volt battery *b*. The auxiliary plate is connected by the contact *c*, connected to the variable resistance *Rw*, connected to the battery *b*. The primary currents act through the transformer T_1, inductively upon the current circuit of the auxiliary plate. The secondary currents, *i. e.*, the relay currents, are taken by the secondary coils of transformer T_2. The use of this transformer is not necessary in principle, except that it prevents the high voltage of 200 to 250 volts from reaching the instruments to be connected. The resistance *W* in this circuit is to prevent a too rapid rise of the gas current. For the proper strengthened a. c. it is bridged by a condenser of the proper magnitude. The strength of the anode current depends on the height of the dark space above the plate electrode. If into the current circuit of the primary coil of T_1 a battery is placed in series with a microphone, and we speak into the latter we notice the changes of the anode currents through the rhythm of speech appear in the change of the dark space and the flickering of the light.

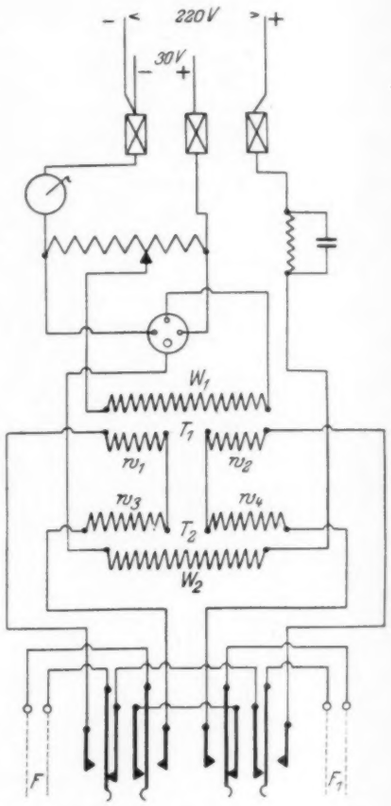


Fig. 5. Relays for Use in Telephone Work.

The form of the relay used by the Allgemeine Elektrizitäts Gesellschaft is shown in Fig. 3. *G* is the glass vessel, *A* is the anode, which is made up of spiral wound aluminum wire of 2 mm. diameter. *H* is the auxiliary plate, which is of aluminum, with openings of 3.5 mm. diameter, uniformly distributed over the surface. The cathode consists of a 3-foot long, 1-mm. wide and 0.02-mm. thick platinum band, which is coated with a thin layer of calcium and barium oxide. Direct current sources of 30 volts are used. The voltage must be constant, as the uniform discharge of the lamp depends on the constancy of current source, for which reason generator current cannot be used. The anode current circuit can be connected to a generator, provided the changes

are decreased by using choke coils and condensors. To increase the effect of the relay, several of them can be used and connected by having the increased current of the first relay act on the current circuit of the auxiliary plate of the second relay. This is shown in Fig. 4, and with the use of four relays the current can be increased to 20,000 without, however, distorting speech.

These relays are especially suitable for telegraph and telephone work, where incoming signals, sounds, current impulses are to be strengthened. The apparatus, as shown in Fig. 2, can be used for all types of telephone work. The coils of T_1 and T_2 are to be wound in keeping with the characteristic in question. If the same is to be used for improving conversation between distant places, the diagram in Fig. 2 is not applicable, as this connection increases the strength in one direction only. The placing of a second relay and connecting the two telephone instrument by a double line is not feasible, and the following principle must be used, as shown in Fig. 5.

The relay is placed in the exchange, which is about half way between the two subscribers' telephones. The telephone currents act inductively upon the primary current circuit of the relay; the secondary current is passed over two current circuits, of which each one is connected directly or inductively to a telephone line. Primary and secondary current circuits may not be connected direct nor coupled inductively, as otherwise a permanent oscillation forms in both circuits which makes transmission of sound impossible. In the Fig. 5 the telephone lines F and F_1 are in series with the windings w_1 and w_2. The primary current circuit of the relay is closed through the coil W_1, the secondary current circuit through the winding W_2. If conversation is carried on over the line, the telephone currents work inductively through the winding w_1 on the primary current circuit of the relay. The secondary currents flow divided into the telephone lines; the telephone currents are passed over F_1 and reflected over F. If the resistances of the two telephone lines are equal, a mutual inductive action of the relay current circuit is impossible. If the telephone lines on both sides of the relay are sufficiently long, *i. e.*, if their damping exponent surpasses the value 1, the resistances of the further connected lines can be of any size. For this reason the impedance or apparent resistance of the subscribers' telephones on long-distance lines has no influence on the effect of the relay. Experiments with these relays have shown that communication over a 2,000 km. line with their aid is as good as that over a 1,000 km. line without relays. The increased current strength of the relays corresponds to a decrease of the damping exponent by 2 to 2.4. If relays are placed into telephone lines at various intervals, distances can be bridged that far surpass those found practical at the present time. With shorter telephone distances, much money can be saved by saving in wire material and using these relays. —*Elektrotech Zeit.*

AUTOMATIC AND MANUAL TELEPHONE OPERATION.

THE tendency to supersede manual work and the use of human labor by mechanical work is very well illustrated in telephone work, in the coming of the semi-automatic and the full automatic operation of telephone exchanges. Strowger, Ericson, Keith, Lorimer, all contributed their share to this endeavor, although the principle with all of them is practically identical. Their success may be attributed in part to the standstill condition of the manual instruments, which only woke up to the needs of improvement with the competition by automatic telephony.

The question whether there is a need for an innovation is in the main answered by the fact that the new system has or has not crowded the old system out of the market. This is not entirely true of automatic telephony. Although several of them have demonstrated that they can give good and effective service, it is true that so far only about 2 per cent of the world's telephone exchanges use the automatic system.

The decision whether manual or automatic is to be used might be helped by finding out whether either meets all the modern demands for efficient operation. Here the answer is affirmative for both types. Manual operation is as highly efficient as automatic operation, and vice versa. We must go further and treat different localities, cities and even countries from a separate standpoint in order to find a solution of the problem. Where the state owns telephone lines, as is the case in Germany and Austria, or where the city owns the plant, the older manual system will prevail for sociological reasons. The institution of the automatic system would throw a very large number of employes out of work, and the state or city must avoid this under all circumstances. If these employes are made unemployed, the state has to supply pensions for them and the expenses from these would offset any savings made with the newer system. Nor is any state or municipal government so independent politically that it can afford to antagonize a large number of voters by instituting such sweeping technical reforms. There were four main reasons for the substitution of the automatic system. In the first place, the subscriber was to be made independent of the vagaries, the moods and tempers of the operator. In the second place, it was thought that the operator's work becomes automatic and mechanical in the long run, and that their work can be done just as well by a machine as by a human being. That operators are under a constant nervous strain at the switchboard and are liable to be nervous in the long run, was also a factor. The third fact was the changing of responsibility for making the right connection from the disinterested operator to the interested subscriber, who would be anxious to make his own connections properly, and it was hoped to reduce wrong connections materially. The fourth point was the saving effected in salaries of employes. The first objection was very true with the older telephone systems, where one subscriber handled his calls with the same operator, so that a personal tone was liable to creep in and resentment might have a play in business affairs at some time or other. This is, however, impossible with the new distributing systems, where any operator can answer the call from any subscriber, so that the work becomes less personal and more mechanical, obviating the objection made to the older systems. The objections to this new system are the increased cost of equipment necessitated by placing a selector with every subscriber's telephone, which selector selects automatically an open operator. The better solution was recently described in these columns and sends all incoming calls to a B-operator, who transmits them directly to any open A-operator in the exchange. The main point is that the personal element is shut out entirely, since neither operator nor subscriber knows what person he is speaking to.

One great advantage of the automatic telephone system is the speed with which connections can be made, which is 8 to 10 seconds, while the greatest speed of the manual system is 19.5 seconds. This means that with

increasing practice of the public at making automatic calls the telephone can be used a greater number of times, and the maximum capacity and efficiency increased to figures far above those possible with manual systems. The old trouble of excess work during rush hours has never been met satisfactorily in the manual system, even in the most modern, for it is almost impossible that the B-operator should at any time not have more than one call waiting for her answer and transmission to open A-operators.

The greatest economic objection to the automatic system has been mentioned several times, and lies in the fact that the system has to be constructed to meet the maximum demands in a future time, and that at the present time of construction a large percentage of the system will lie useless and non-productive. Another objection is that complicated and expensive mechanical devices have to be used for doing work which in the manual system is done by much cheaper and simpler apparatus. The manual exchange changes its number of operators in keeping with the demand on the exchange, increasing the number during rush hours, decreasing it at other times and at night. Rotterdam shows that during rush hours within five days forty-three operators were on duty 450 hours, which number was reduced at night to two operators. If the system were automatic, the number of hours would be $43 \times 24 = 1032$ hours, which means that the automatic exchange has rush hour conditions at all times of day or night, so that a large percentage of this provision is simply wasted. The last argument in favor of the automatic system is the saving in operators. There is no doubt that a good deal is saved in wages, but the question is whether this saving is not eliminated by the necessity of installing equipment far above the needs at the time, and necessitating large investments, a large percentage of which does not bring immediate returns. Unfortunately there are no concrete figures of late years that would allow us to give a definite reply. There is no question that on the mere technical engineering side the automatic telephone is an advance over the manual system and works perfectly and satisfactorily wherever it has been in use. The doubts are on the economic side, though, and here we stand before an open problem which cannot be met as yet, and will probably not be met for some time to come. It would be interesting, however, to hear from actual operation and to have concrete figures in order to arrive at an answer to this very important question in the telephone field.—*Elektrotech Zeit.*

LOUD-SPEAKING TELEPHONE RECEIVERS.

IT is comparatively simple to obtain loud tones or clearness of sound in a telephone receiver. The difficulties arise when we try to unite both in the same instrument. The tone and the clearness depend to a large measure on the measurements of the diaphragm and the method of fastening. All diaphragms possess a certain natural tone, depending on the natural period of vibration. This tone depends on the weight of the diaphragm or any parts fastened to it. If the mass moved is not kept within small limits, this tone affects speech. The problem to build a satisfactory transmitter consisted mainly in the desire to get the greatest current strength without having it influence speech. We want to have an instrument that will favor the overtones against the fundamentals. This principle holds just as true for receivers, and therefore the diaphragms are ribbed and placed on rubber cushions as is done in the phonograph. A lever arm connects the diaphragm with a soft iron armature, which forms the part affected by the current. The diaphragm itself consists of phosphor-bronze, which has proved to be the best for the purpose. By emphasizing the magnetic principles used in the construction of the polarized bells, the clearness of speech was increased. This success is due to the decreased inertia of the masses moved. The use of a differential magnetic circuit in the receiver permitted a double positive action of the diaphragm. In the rest position the diaphragm is under no tension. This increases the effect very much, as a much smaller air space may be used.—*Zeit. f. Schwachstrom.*

TELEPHONE INFECTION.

THE *Monattsblatt für Gesundheitspflege* brings an article by an eminent physician who treats the danger of infection from telephones. He says that opinions as to this danger vary a great deal. Laymen, as a rule, also firms manufacturing telephone disinfectant devices paint the danger a flaming red; doctors, on the other hand, are skeptical. One very good, if not truthful, advertisement by a German firm manufacturing sanitary mouthpieces, etc., shows a red devil issuing from a telephone transmitter with the reading: "Death in the telephone." The best indicator for the truth of these assertions is the medical press. Investigations have shown no clear case that could be laid at the door of the telephone. The daily papers now and then bring an article on some skin disease transmitted by the receiver or transmitter, which case is, of course, exploited to its fullest extent by certain interested firms. Most, if not all, of these are from laymen, who cannot be judged competent to decide. From the medical standpoint it may be said that telephone infection is unknown.

While disinfection of the instruments is not urged by the medical expert, it is desirable nevertheless on aesthetic grounds. For that reason and reasons of cleanliness, physicians are in favor of using proper means to clean the instruments. Among the numerous patents on the market for disinfection of the telephone there are hardly any that may be said to be practical. Most of them are too complicated and too expensive for ordinary use. Best of all are the disinfecting liquids, for the simple reason that their fundamental principle lies in cleaning and washing the telephone. Public telephones in office buildings ought to be cleaned each day several times by persons whose duty it is to keep them clean, using one of the liquid disinfectants in the water.

MUNICH AUTOMATIC TELEPHONY.

THE following figures show the average cost of the automatic telephone system in Munich, which has met all the expectations placed in it by the Bavarian Post and Telegraph Department. The Bavarian department has removed 7,000 telephone instruments from subscribers and substituted for them the automatic telephones. The value of these instruments removed is $175,000, since they are in shape for at least ten years' efficient service. The value of the new instruments installed is $500,000. The 15 per cent allowed for depreciation and interest amounts to $100,000. The number of telephone operators unfortunately is not reduced, as the 7,000 subscribers make up only a very small fraction of the Munich telephone system, so that the expense for operators is still about $30,000. To this expense must be added the salaries of expert engineers and mechanics to take care of the automatic telephones, amounting to $12,000. The annual costs for the 7,000 automatic subscribers amount to a total of $142,500.—*Zeit. f. Schwachstrom.*

Standards for Telephone Service

Paper Read Before the Convention of the Independent Telephone Association of America

BY J. N. CADBY*

WISCONSIN'S law requires that all public utilities furnish adequate service, and invests the railroad commission with authority to formulate from time to time such standards and definitions of adequate service as it sees fit. Some five or six years ago rules covering gas and electric service were formulated and have been administered since that time. At present the engineering staff serving this commission is formulating standards for telephone service. These rules are still in the period of construction, having been presented first in a state convention of telephone men, and after revision presented in a preliminary hearing to which telephone utilities were invited. At this hearing many suggestions and criticisms were made with the result that still further modification and revision have taken place.

The rules have been formulated to suit all exchanges in the state, from the largest to the smallest. As far as we know, no such standards have ever been formulated elsewhere, and you will appreciate that the task of preparing such a set of rules is not the easiest. The following are the rules as they stand at present, together with the explanations to accompany them, although both are subject to change before presentation at the final hearing, and still further revision before becoming actually adopted:

LINE CONSTRUCTION.

Rule 1. The equipment and lines of each telephone utility shall be so constructed and maintained as to eliminate as far as practicable, all cross-talk and objectionable noise on the line and to insure good transmission of messages over distances ordinarily made use of.

Rule 2. On new construction not more than twelve subscribers shall be connected to any one line having a length of ten miles or less. On longer lines this number may be exceeded with the consent of the commission. Present lines having more than twelve subscribers connected shall be reported to the commission at once and reduced to twelve or less as promptly as possible.

It is expected that the number of subscribers on any one line will be reduced to a much lower minimum where the same is justified by the use of the service and the revenue derived therefrom.

Rule 3. Each telephone company giving service between any two cities or villages, should maintain at least one line for through traffic between these places, along which no subscriber's instruments are connected. Where the through traffic is heavy, additional lines shall be provided sufficient to maintain adequate service.

The above provision for through traffic between two exchanges or communities should be provided independent of whether such service is on a toll basis or is included in regular charges for service. In many sections of the state it will be necessary to provide a large number of lines between cities or exchanges for through traffic.

Rule 4. Every telephone company shall make such tests and inspections as may be necessary to insure that its lines, instruments and other equipment are maintained in condition for rendering adequate service.

The natures of these tests and inspections will depend upon the kind of system, the protective devices installed and the interference from storms and other external sources usually experienced. Signaling equipment, switchboard cords and other equipment requiring frequent attention should be kept in first class order at all times. The commission does not desire to specify exactly the nature and extent of these tests, but the inspectors will criticise the practice of the companies in complying with this order and make suggestions relative to necessary changes in testing practice. When it is impossible to make permanent repairs very promptly, temporary repairs should be made. Those, however, should be made permanent at the earliest possible time.

GENERAL OFFICE.

Rule 5. Each exchange shall have sufficient switchboard capacity and operating force to handle the traffic at all times with reasonable facility. Sufficient traffic studies shall be made by each utility to provide for necessary extensions and to demonstrate to the commission that sufficient equipment is in service.

The traffic studies should include such items as the number of calls made during the busy hour and during other periods of the day and night, together with the way in which this traffic is divided up between operators, the time of day when the heaviest loads occur, and whether or not this varies with the day of the week or month and with the seasons or weather conditions. In other words, the tests should be sufficient to show the telephone company has the traffic condition well in hand and has anticipated the needs of additional operators or switchboard capacity. These studies should also indicate the demand for trunk lines between exchanges.

Rule 6. Reasonable efforts shall be made by every telephone utility to provide for meeting all emergencies such as failure of lightning or power service, sudden increase in traffic, illness of operators and storms, fires and other emergencies which would seriously affect the service, were those provisions not made.

One operator should not be left to run the exchange alone without having some one to call in emergencies. There should be some provisions for changing over to another system of ringing as well as a reserve source for lighting which is instantly available. A reasonable stock of repair parts and line supplies should always be on hand.

OPERATING FORCE.

Rule 7. Any telephone exchange serving more than 500 subscribers shall be considered as giving reasonably prompt service if 94 per cent of the calls are answered in 10 seconds or less. All other telephone exchanges should answer at least 90 per cent of the calls within this period. Where the traffic is insufficient to require the entire attention of an operator, and the exchange is operated in connection with other work, slower service may be adequate. The operators should follow up calls with reasonable care and should disconnect the parties promptly after the calls are completed.

If an exchange is being operated in connection with some other work on the part of the operators, the commission may require the exchange to be operated independently whenever the traffic and revenue warrant such change of operation.

Rule 8. Each telephone company should adopt suitable rules and instructions covering the phraseology and methods to be employed by operators in handling regular and special calls.

In any line of work a systematic way of doing things has distinct advantage over the absence of such practice. In any line of work where speed, accuracy and relia-

*Wisconsin Railroad Commissioner.

bility are of such vital importance as in the telephone field, it is necessary that a definite plan of operation be formulated. It is probable that operators should always repeat the numbers in order to eliminate as far as possible the giving of wrong numbers. Most companies already follow this practice but a few who do not repeat the numbers are maintaining service which is reasonably free from wrong numbers. Telephone courtesy is extremely important to the growth and development of the telephone industry, the encouraging of the use of the telephone for important work and the eliminating of dissatisfaction and complaints on the part of subscribers. Not only is it necessary that employes of the telephone utilities are courteous over the telephone, but they should encourage courtesy on the part of all users. Employes should not be allowed to listen on telephone lines in use except where this is necessary in the carrying on of the work. In general, it is considered a punishable offense to violate the secrets of telephone communications which may be overheard. Operators should be very careful never to divert traffic from one subscriber to his competitors, or to discriminate in the quality of service and attention given to various subscribers. Those matters are very important and violations will be dealt with vigorously by the commission whenever detected.

INFORMATION AND TREATMENT OF SUBSCRIBERS.

Many complaints will be forestalled by furnishing subscribers with all the information they should have in order to utilize their telephone service easily and efficiently. The following rules should be of assistance along this line:

Rule 9. Telephone directories of exchanges serving over 1,500 subscribers shall be revised semi-annually; the directories of all other exchanges should be revised at least once each year.

The revising of directories should be governed by the number of changes necessary to make them correct and up-to-date. Where the changes are so few as to become practically negligible, a telephone company should apply for modification or exemption from this rule. In general, it will probably be necessary to revise directors as frequently as required in the rule, and in some instances it may be desirable to even make the revisions more often.

Rule 10. Every telephone utility should publish in its directory or otherwise such instructions as may be necessary to inform subscribers of the action they should take in order to obtain efficient and adequate telephone service from its system.

Rule 11. Rules governing toll service shall be posted in all pay stations and printed in all directories.

Rule 12. Every exchange shall maintain a record showing all complaints, interruptions or irregularities and to promptly take care of all complaints or irregularities which arise.

Such a record of complaints will indicate to the company officials and to the commission's inspectors whether or not any particular subscriber encounters the same difficulty frequently, when a large number of complaints arise from the same irregularity in service, and whether some phases of the maintenance or operation are unsatisfactory. The ordinary slips filled out when the complaint is made, together with the notes of the troubleman, will be satisfactory. Subscribers should have definite instructions as to how and to whom they should report trouble or irregularities. The one to whom complaints should be made should be easily accessible and should have time to follow up these complaints and authority properly to correct irregularities which exist. All employes should be encouraged to report complaints, irregularities and criticism whenever these are received either directly or indirectly whether on duty or not. A record showing but few complaints does not always indicate satisfactory service. Patrons should be encouraged to report irregularities, and when the complaints are received, sufficient questions should be asked of the complainant to record definitely what trouble the patron has experienced.

Rule 13. In order to facilitate the enforcing of these standards, each telephone utility shall file with the commission the name and address of the official or employe with whom service complaints and irregularities shall be taken up in order to insure prompt and careful attention to the irregularities so reported.

TOLL SERVICE.

Toll service should be properly routed to give most efficient service as well as justice to the telephone companies where more than one utility is involved. In general, toll circuits should be tested out early each morning in order that trouble may be promptly eliminated. This is particularly important after storms. On joint lines or when one utility uses the lines of another utility, trouble on circuits should be promptly reported to the utility responsible for the maintenance of the line. Accurate and convenient timing devices should be installed in order that toll charges may be just, and that the service may not be unnecessarily delayed in order that the calls may be properly timed. The tone of voice used by the operators is very important, particularly on toll service. Toll operators should cultivate not only a distinct articulation, but low tones and pleasing voice. This would add materially in giving satisfactory service at highest efficiency. A record of the condition of long distance circuits entering each exchange should be maintained for the convenience of the utilities in properly maintaining their lines, and for the commission's inspectors in investigating service conditions over toll lines.

Arguments in Refund Case

Arguments were heard by the Supreme Court at Oklahoma City, Okla., in behalf of the Pioneer Telephone Company's application for a rehearing of the case recently decided by the court wherein the company is directed to pay back to its Oklahoma City subscribers approximately $62,000 in refunds for alleged excessive telephone rates. The opinion, affirming the order of the corporation commission directing the refund, which was written by Justice R. L. Williams, was handed down by the court several weeks ago.

Attorneys representing the Pioneer Company stated they were not opposed to making a refund, but wanted to wait until such time as the corporation commission determines what are just and unjust telephone rates in Oklahoma City. They took the position that the commission might eventually hold that the rate now in effect was not excessive and in which event there would be no refund to make.

The commission issued an order to the effect that no telephone company could increase its rates after October 1, 1908, without first gaining the consent of the commission. The Pioneer Company violated this order and increased its rates. The refund ordered represents the difference in the rate in effect at the time the increase was made and the rate now in effect.

The commission is now engaged in an exhaustive study of the telephone business generally in an effort to promulgate new rates for telephone service.

The Telephone Scrap Book

Curious and Useful Items, More or Less Telephonic, Gathered from Everywhere

Showing Make-Up of Cable Armor; Also How Badly Cable Was Twisted.

Section of Submarine Cable. The End in Foreground Shows Where Tug's Propeller Twisted It Until It Broke in Two. The Two Ends at Top Are Where Cable Was Cut to Make Splice.

Another View, Showing Conditions Similar to the Last One.

An Unusual Cable Trouble

EVERY peculiar and unusual accident occurred on October 30, when the Hamburg-American Line Tug No. 3 fouled the United States Government submarine telephone cable extending from the new barge office at the battery to Ellis Island, says A. H. Keteltas in the *Telephone Review,* from which these cuts are taken.

The cable is made up of thirty-eight stranded conductors, each equivalent approximately to No. 14 B. & S. gauge. Each conductor is especially insulated and is absolutely waterproof. The armor consists of thirty-three steel wires, three-eighths inches in diameter, wound spirally around the cable, the completed cable being four inches in diameter.

The Center of This Picture Shows Where the Two Layers of Cable Were Twisted Together Until Their Combined Diameter Was Not as Great as the Original.

At 3:45 p. m., on October 30, all lines extending from the Broad central office to the Private Branch Exchange on Ellis Island were reported "out of order," and upon test they were all found to be "grounded both sides." At 4 p. m. all lines tested "clear and open" towards the Island, the capacity test indicating that the trouble was on or near Ellis Island, and this, together with the facts that the grounds had disappeared and the lines tested "clear and open," led to the assumption that the trouble was on the Island. When the inspector reached the Island he found, however, that all conductors in the cable tested "grounded and short circuited toward New York."

With these conditions existing, we had a decidedly peculiar cable trouble, especially so as the cable involved was a "submarine," the trouble locating under the bay, all conductors from one end testing "clear and open" and all conductors from the other end testing "ground and short circuit."

Taking into consideration the size and weight of the cable, it is evident that an enormous power must have been exerted in order to twist it up in the condition shown in the illustration. There were fifteen complete turns of cable about itself, and in one place the two thicknesses of cable were twisted so tightly together that their combined diameter was less than that of the original cable.

The "clear and open" test from New York was due to the tremendous pressure which broke the wires and embedded the ends in the insulation so completely as to exclude all moisture, while the "ground and short circuit" test from the Island was due to a cut in the cable between the twisted portion and the Island.

The Hamburg-American Line Tug No. 3 is the most powerful tug in the harbor and was built especially to warp the Steamship Imperator into and out of her pier. She was so badly damaged as the result of this encounter that she was unable to proceed under her own power and had to be towed away.

The cable repairs were made under the direction of government officials.

From Japan comes the report that a wireless telephone service is to be established between Tokio and Yokohama. Owing to the steady increase of telephones in the latter city a new exchange is promised for the suburbs of the city. In Yokohama there are 4,100 telephones in use.

Col. Squier's Wired-wireless

At the recent exhibition in London of the Physical Society Messrs. Muirhead & Co. had on view Col. Squier's patent wired wireless field telegraph. This is the first successful attempt to secure both telegraphy and telephony simultaneously over field wire lines, and as such is of great importance to military authorities. As is well known, the upper limit of audibility varies considerably, but is approximately from 15,000 to 20,000 cycles per second. It is therefore obvious that if E.M.F. of frequencies of above 15,000 to 20,000 cycles per second are impressed upon a wire circuit, whatever effects such electric wave frequencies produce, the present apparatus employed could not translate these effects into audible signals. In materializing this principle the manufacturers have embodied in these portable sets a high-frequency generator energizing an oscillatory circuit which is inductively coupled to the line. The electromagnetic waves are of a frequency of about half a million per second and are guided partly along the outer skin of the conductor and partly along the narrow strip of ether surrounding it. By thus limiting the radiation to this narrow strip of ether and directing the waves to their destination, experiments have shown the remarkable efficiency of this form of directed wireless telegraphy, for the power required is only a fraction of that in the ordinary case, where wireless waves are permitted to spread out in all directions over the surface of the earth from an elevated antenna. For the reception and conversion of these high-frequency waves into audible signals, wireless practice is very closely adhered to, the line being inductively coupled to a tuning circuit, an adjustable air condenser providing the necessary selectivity. The detector is a robust form, of carborundum and steel, a critical impressed voltage being applied from a potentiometer. With pure wireless telegraph field stations, the principal disadvantages are: Interference between stations, the danger of the enemy picking up messages, the likelihood of breakdown due to "atmospherics," or deliberate interruptions by the enemy. In wired wireless field sets it has been found possible to furnish an ideal system of communication over field wires, since it permits the ordinary telephone to be used in the form of portable field sets and at the same time the same wires employed to guide the electromagnetic waves from small portable "wired wireless" sets. The whole apparatus has been designed with the following characteristics as the guiding principles, viz., compactness, simplicity in operation, quickness of installation and reliability. Although the single small portable case containing the complete equipment is practically an up-to-date miniature wireless plant, for both transmitting and receiving, yet many of the usual adjustments required in wireless stations are entirely dispensed with, and since there is no antenna to be transported, the equipment is reduced to remarkable simplicity. To install a wired wireless field station complete for operation requires only that the soldier shall drive a small metal earth rod into the moist ground and connect the flexible piece of wire atached there to the earth terminal of the set. The line terminal of the set may be connected to the line wire by means of flexible wire and a spring clip, the latter having teeth which pierce the insulation, making contact with the strands of the conductor itself. This avoids the necessity of even removing the insulation. In the accompanying illustration, the apparatus is shown with the front board dropped down. In the left-hand top corner is the tuning condenser and in front of this the telephone connections. In the center at the front is a two-way switch, one contact for sending and the other for receiving. Above this is a stepped inductance for giving the desired frequency, and then the terminals for the line and earth wires. Further to the right is the potentiometer and the generator is situated at *A* with the tapping key in front of it. The extreme smallness of the generator is noticeable, being simply a small buzzer, and the necessary energy is supplied by the three dry cells seen in the lower part of the case. For transmission over a distance of thirty or forty miles this forms a marked contrast to the usual radio-telegraphic transmitter as regards size and energy. Since the center switch provides a number of frequencies, several transmitters can be used at one time with different frequencies on the same line simultaneously without interference, the corresponding receivers being correspondingly tuned.

Colonel Squier's Wired Wireless Field Telegraph.

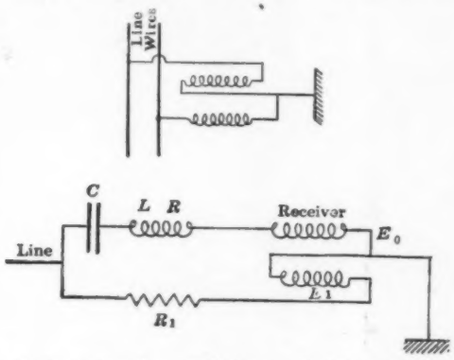
Disturbances from Single-Phase Lines

G. GIROUSSE, engineer of state telegraphs, France, discusses in *La Lumière Electrique* (translation by *Electric Railway Journal*) several methods which are available for reducing or preventing single-phase distribution systems from disturbing telephone and ground-return telegraph circuits. Four remedies are mentioned, namely: Using compensating devices, shifting the circuits to pole lines at least one mile distant from the high-tension route, placing them underground, and doubling them by adding return wires. All remedies but the first are rejected by M. Girousse as too costly. He states that for telegraph lines very satisfactory results have been obtained with the following inexpensive schemes as first tried in the latter part of 1911 on the 6,000-volt, twenty-five-cycle Maritime Alps, 10,000-volt, twenty-five-cycle Haute-Vienne and 12,000-volt, twenty-five-cycle Oriental Pyrénées single-phase systems. Since then complete installations have been made for the first two lines named, and equipments for the Oriental, Haute and Basse Pyrénées lines will soon be in place.

PROTECTION OF TELEGRAPH CIRCUITS.

As shown in the accompanying wiring diagrams, use is made of a receiver, which has two coils with the same

number of turns and connected differentially. One of the coils is in series with a condenser C and a self-inductance L; the other is in series with a resistance R. As the telegraphic current is continuous, it does not traverse the former coil, and, consequently, the receiver acts in the normal fashion.



Methods of Protection from Telephone and Telegraph Disturbances.

If the two circuits present the same resistance and the same reactance, the disturbing alternating current will divide in two parts alike in amount and phase, and consequently the receiver will not be disturbed. It is clear that the conditions are satisfied theoretically when there is resonance between the capacity C and the self-inductance L for the frequency of the disturbing current, and that R, the resistance of the self-inductance coil, is equal to the resistance R. When the conditions are carefully determined in advance, an arrangement of this kind will give good results without necessity for regulation from time to time.

PROTECTION OF TELEPHONE CIRCUITS.

Telephone circuits require two important precautions, good insulation and minimum inductance. The insulators should be of the industrial type with large petticoats, instead of the present French type with two bells. The petticoat insulators are much easier to maintain, particularly in cleaning, and they cost little more. The insulating points on telephone circuits which leave most to be desired are the underground sections, which until lately have been freely installed at crossings with heavy-current transmission lines. These underground sections, especially at the junctions with aerial lines, constitute the weakest points of a telephone circuit and should be avoided wherever possible. To minimize induction, the number of transpositions must be increased. It would probably suffice to make such transpositions every 125 meters (410 feet).

M. Girousse states that it is also necessary to take certain precautions at the telegraph offices, for it is useless to insulate the line carefully if the office equipment suffers ground losses. To remove the interurban circuits from the bad influences due to losses either on the lines or the inside equipments, it is best to isolate the circuits by means of transformers. Excellent transformers which insulate against high-tension current are now available.

On some of the existing installations the derangement of lines within the influence of induction from single-phase track circuits has been caused frequently by carbon lightning arresters. The extreme sensitiveness of this arrester is usually a valuable quality, but when its nearness to single-phase circuits causes excessive operation the particles of carbon become detached.

This disintegration causes leakage to ground which cannot be neglected. Therefore, it is desirable to replace such apparatus either by horn or vacuum type lightning arresters. This change will eliminate the destruction of the arresters, but it is still necessary to have a device to avoid shocks. If transformers were used, they would protect the office force, but they would not protect the workmen on the line. In order to eliminate all dangerous high tensions, grounding discharge coils should be installed. These coils should be of the Cailho type which are used for telegraphing on telephonic circuits. This coil, however, as ordinarily made, is not intended to take care of the high-voltage currents induced by single-phase circuits. A modification for the latter purpose known as the Perego coil is the one which has given good results on the telephone circuits of the Oriental Pyrénées lines.

CONCLUSIONS.

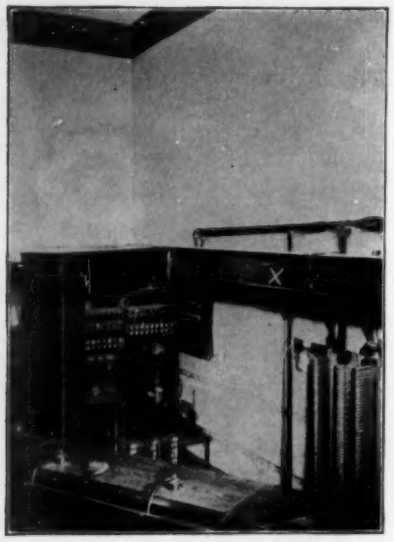
In conclusion, M. Girousse states that the single-phase lines as usually installed up to the present time offer grave difficulties to telephone and telegraph circuits. It is desirable that these troubles be made negligible. While it is difficult to make these changes on existing lines, the methods described do permit the satisfactory operation of telephone and telegraph circuits at a very small additional expense.

A Falling Liquid Telephone

TELEPHONING over space for 600 miles is the astonishing feat accomplished by Prof. Vanni, a prominent Italian scientist, and this result marks a step which will be remembered in the history of wireless work, says *Popular Electricity*.

The present experiments were made at the Military Wireless Telegraph Institute and at the Cento Celle station not far from Rome. With his new apparatus Prof. Vanni was able to transmit speech across the Mediterranean to Tripoli, a hitherto unheard-of feat, for the distances formerly covered by wireless telephony were far less. The telephone which he uses is not at all of the ordinary kind, for it works, in fact, by falling drops of water. Although not the first to make use of this principle, for the American inventor, Chichester Bell, and later on Prof. Majorana, employed it, it remained for Prof. Vanni to bring it to the present remarkable state of perfection. Supposing we make use of a very fine stream of water falling from a hole in the bottom of a vessel and then connect the vessel to a telephone membrane in the proper way. When we speak against the membrane it vibrates in the way with which we are familiar and the liquid stream also vibrates in the same way. Such a vibrating liquid stream shows some very curious properties. The vibation causes it to take the shape of separate drops which cannot be perceived by the eye, as they pass too fast, but when properly photographed it is seen that each separate drop vibrates under the action of the voice, becomes flattened out and then takes its proper shape, keeping up this trembling movement while it is falling.

Vibrating Drops.



Exchange Room, Panama-American Corporation at Panama, Showing Cable Runs Enclosed with Steam Pipes to Keep Cable Dry.

A Novelty in Telephone Poles, Made of Spliced Steel Rails to Withstand Insect Attack, Gatun Canal Zone.

Exposing Sample Pieces of Cabinet Wood to Ant Attack, Canal Zone.

Tropical Telephone Troubles at Panama

TELEPHONE companies operating in the tropics have peculiarly severe climatic conditions with which to contend. As a result, apparatus which operates satisfactorily in the United States sometimes develops trouble in the more humid climate of the tropics, says C. P. McConnell in the *Western Electric News*.

The telephone occupies a very important place in the work of the canal. The telephone and telegraph lines of the Panama Railroad follow the course of the canal. There are six common battery exchanges located along the canal from Colon on the Atlantic side to Ancon on the Pacific side. These exchanges furnish communication between all the department offices, commissary stations, hotels and residence of employes. There are also special circuits set up at different points to facilitate the movement of the dirt trains down in the cut. Temporary connections are frequently set up wherever occasion requires them, as on a dredge, located in a certain working position, on some part of the concrete structure of the locks or dams, or even a sidetracked freight car.

What White Ants Can Do to a Piece of Wood.

The principal cause of the troubles met with in the tropics is the excessive amount of moisture with which the atmosphere is continually charged. It is this high humidity which makes it difficult to maintain proper installation in telephone apparatus, and as a result, special precautions are necessary to render switchboard cable, cords, coil windings, and the like, capable of withstanding the dampness. The use of switchboard cable, cords, coil windings, and the like, capable of withstanding the dampness. The use of switchboard cable with enameled wire conductors has eliminated a great deal of the trouble, and moisture-proofed cords and coils have further reduced the amount of leakage and corrosion which previously was of frequent occurrence.

The exchanges in the canal zone use electric heaters in the terminal rooms, and lamps in the switchboards, an effort to keep the apparatus as dry as possible.

In regard to outside equipment, the life of all materials is much shorter than in a more temperate climate. Almost all metal parts exposed out of doors are subject to rapid deterioration. Rubber and textile insulation on wires is also affected very rapidly. In fact, there seems to be hardly a material which is exempt from these deteriorating influences. It has been found, however, that much less trouble is experienced with magneto apparatus than with common battery apparatus, in the way of leakage and electrolytic corrosion. The reason for this is that potential stands on the common battery lines continually and only during use in the case of magneto apparatus.

Insects are great pests in the tropics, and frequently do serious injury to telephone apparatus. The most serious trouble is caused by the termite, or "white ant," which resembles the worm frequently found in apples. The white ant attacks woods, except certain native species, drilling and honeycombing the interior of the woodwork, unseen.

On account of this insect trouble, many of the telephone companies use iron poles in preference to wooden poles. In the canal zone a very satisfactory substitute for wooden poles has been found in old iron rails, which are set in concrete, several lengths being bolted together to gain the desired height. Creosote acts as a deterrent to insect attacks, and is used wherever possible.

Western Pennsylvania Independents Meet

The fifth annual convention of the Western Pennsylvania Independent Telephone Association opened January 23 in the Hotel Antlers, Pittsburgh, and was attended by about 100 representatives from independent telephone companies in that part of the state.

At the opening session President J. Walter Barnes of Fairmont, W. Va., presided. C. Phillips Hill of Pittsburgh gave the address of welcome. H. E. Bradley of Philadelphia, Pa., gave a short talk on "The New Female Labor Law," and J. C. Core of Uniontown, Pa., spoke on "Toll Business." An address dealing with the building of toll lines was made by T. J. Shufflin of Butler, Pa. Reports made by the delegates who attended the national association held in Chicago, Ill., at the beginning of the year concluded the session.

Making a Market for Home Securities

Paper Read Before the First Convention of the Independent Telephone Association of America

BY W. F. GOODRICH

ON THIS subject the writer does not assume to comment from the standpoint of the broker or banker with securities to sell, but rather from an experience in financing by the secretary and manager of a local operating company of 5,000 subscribers in his own competitive community, and regardless of, however much the securities of other utilities may suffer in comparison to those of the properly managed telephone company.

Financing on this plan or theory, rather than with capital foreign to the local community, is productive of the two essential requisites for success of the enterprise, namely, money for development and co-operation of security holders for patronage. I have never known of a telephone company but that in some period of its career, either at its inception, at the changing of its equipment, at its rebuilding period or at the construction of its fireproof building did not offer the opportunity of putting out an issue of securities for a specific purpose, which is so essential for selling arguments.

The small plant of 1,000 patrons, and a 5,000 territory to develop, may well organize itself by providing a superintendent, who will relieve the manager of all plant duties except supervision and leave him free to devote himself to the disposal of his securities in connection with handling the commercial department of his business. Selling securities in his own community, and looking after the soliciting and advertising of the business at the same time, always works out to good advantage.

It is not to be expected, however, that the manager is constantly conducting a financing campaign, because there is such a thing as having all the money needed at times for development. But he should at all times be conversant with the prospects of his business and ready to take another stockholder for a reasonable or small allotment, if for nothing else than to gain a stockholder; for each stockholder makes a telephone solicitor.

The manager who is a successful financier and sells his own securities is pretty sure of a long time position as such, because in no other way does he gain the confidence of his directors and the public in such measure. Every utility company knows how much easier it is to find practical engineers than to find men capable of financing and dealing successfully with the public. The manager who has financed the business and remained for year after year in such capacity becomes an asset to his company and it is questionable if the public does not eventually consider him, rather than the business itself, the stable security for its investment in the telephone company. He is considerate of his stockholders on all occasions by making stock transfers without charge, by finding buyers for those who need conversion to cash without charge, and in all other ways in which they become under obligations to him; because one stockholder frequently induces another.

The time for selling stock having arrived, the first question from the investor, "What do you want this money for?" has always seemed to me to be the logical opener for the financing manager, and he should be well prepared to discourse on his specific purpose and the benefits of the particular appropriation, with a liberal flow concerning home enterprise.

I prefer straight stock issues myself with denominations of $100 for common and $50 for preferred, preferably 7 per cent cumulative, all voting stock and a liberal redemption clause. The whole stock description and redemption clause printed in the certificate is right and proper and engages the attention of the buyer. In his own community he is selling mostly to people with balances in the savings banks who are looking for a good safe local place to earn more than 3 per cent on their savings, and their knowledge of stocks being limited, a certificate and stock ownership often starts an education along that line and creates a desire for more stock.

A preferred cumulative 7 per cent stock at $50 per share par value, from my experience, is a good denomination on which to solicit sales from all classes of people. All business men, especially of small means, should be solicited by the financing manager, which brings him in personal contact and acquaintance with desirable subscribers; and a day's work usually nets a few telephone contracts in addition to stock sales.

I have never been partial to bonding, as the mortgaging has always been distasteful and once filed closes the opportunity for doing it again in any emergency. The receipt of semi-annual dividend checks by mail on July 1 and January 1 is more welcome to the public than the cash from the presentation of the bond coupon, which now requires an attached certificate to the government.

There is no harm in soliciting every business man in the community and spreading your stock as much as possible. To the $100,000 issued, 250 or more stockholders is none too many and the nearer you approach the mutual idea in numbers the stronger will be your support; not forgetting that always thereafter you will have the same people bringing their money unsolicited for investment in your business when they have another $50 or $100, instead of taking it to the savings bank.

I think there is one great mistake in financing that many companies are apt to make. I refer to

The World Wants This Man

BY BERTON BRALEY.

We seek him everywhere
Amid the throng.
We've sought him here and there
And sought him long,
Hoping among the mob
He'll chance to dwell—
The man who knows his job
And does it well!

We know of labor's woes,
Nor hold them light,
But ah, the man who knows
His business—right!
Workman, or cop, or clerk—
He makes a hit,
The man who knows his work
And 'tends to it!

The world has constant use
For men like this.
Who's work's not fast and loose
And hit or miss.
It seeks, with heart throb,
Where he may dwell—
The man who knows his job
And does it well.

the passing of dividends and using the earnings for extensions. The stockholders are entitled to their dividends. It is all right to use earnings for extensions, but the dividends should first be paid, as I believe a continuous dividend payer can almost always sell securities when needed. For every dollar you increase your plant you should be entitled to issue stock against it, if necessary to pay those dividends. And so long as you pay you will have a satisfied list of stockholders who do not even attend meetings; but pass a dividend and you will have a full meeting without any effort.

The utility commissions of several states now have control of the issuance of securities against plants to prevent the issuance of watered stock, but any manager who does the financing for his own company knows the value of a true balance sheet and is not likely to present a statement to a prospective investor that he cannot promptly and conscientiously justify.

For several years I have had printed in the newspapers at the close of our year a statement of our balance sheet and the income and profit and loss for the year and have traced direct stock sales to the insertions. I can see no objection to legitimate publicity of finances of a properly conducted plant, and it certainly sells stock in the enterprise.

The making of a market for home securities is so consistently and essentially dependent on the manager who has his position at heart, that to me it is hard to discuss the topic without in part defining the principal duty of the manager. And any manager not taking advantage of his opportunity is to me losing out in his efforts to promote his business.

There is nothing impossible in asking a citizen to view your statement, and it is most fascinating work to follow up the point he questions you about, not only in your first visit but subsequently. If you meet with refusal at first ask him to think it over and you will call again. Certainly the telephone manager is entitled to the courtesy of interviews in his own town.

I have found that there are many cliques or societies of men, possibly card players, in each town; and one interested member in his club can induce several sales for you. If the interested member happens to be a printer or a bookbinder or a local dealer in supplies you need, increase your orders to him because he is a mutual help to you and you should work for each other's mutual interests.

The manager comes in contact with more people than any other employe of the company. If he never loses an opportunity to tell a subscriber that any subscriber to his company is entitled to buy stock in his company that pays 7 per cent, he is bound to attract many who would not otherwise know of it.

By standing for a patronage of home industry and practicing it by making all the purchases at home he can, the manager will get a standing in the local commercial club (of which he should be a member), which will put many under obligations to assist him.

I have never considered that the manager should antagonize his directors by demanding the usual 1 to 5 per cent commission on stock sales in addition to his salary, because it is a part of his duties, and being successful, he will probably be awarded a salary by the directors equal to all the business will stand.

Cultivation of the secretary of a building and loan association will open up a way to learn the names of paid-up stock which the loan company is about to pay, or a friendly banker will induce his savings depositors looking for a higher rate of interest to call on the telephone company. I believe it possible very frequently for the telephone company to become the industrial enterprise of the town in which the smaller investing public will largely place its surplus.

Personal solicitation is necessary in placing home securities and I know of no individual better equipped with knowledge of his own business for soliciting purposes than the manager himself, and it certainly gives him a standing in the community that justifies his position in fact as well as in title.

Financing Telephone Expansion

The annual report of President B. E. Sunny of the Chicago Telephone Company for the year 1913 shows that the total number of telephones connected to the company's exchanges at the close of the year was 430,812. Six years ago the number of telephones connected was less than half of the present number. .The increase in the number of telephones in Chicago continues to be largely for the low-priced service. In 1913 the number of telephone stations increased 48,275. About $6,000,000 of new capital will be required in 1914 to care for new subscribers. The rapid growth not only means the addition of new plant, but also involves the replacement of existing plant, in some instances long before it has had a normal life. Mr. Sunny makes some interesting observations on this point:

> While the replacement has been in the past largely with reference to outside plant, the removal of poles and wires and the substitution of aerial or underground cables, and the substitution of larger cables for smaller ones, we are in a condition now where several exchanges in the city, including the land, buildings, switchboards and other equipment, must be abandoned. The salvage value of these exchanges will be small, but new and larger exchanges must be provided. Not only are exchanges outgrown, but the wire center shifts. Exchanges located ten years ago, or even more recently, at what were then the wire centers of the districts to be served, are now found to be from half a mile to a mile or more from the present or prospective centers, owing to new telephones installed. Because of the heavy expense for conduits and cables, the necessity of having exchanges centrally situated will be readily appreciated. The exchanges of recent years have been constructed with reference to a continuing large growth. Larger parcels of ground have been bought and buildings and switchboards provided in such manner that additions can be made readily and effectively.

The 430,000 telephones of the company are used on an average seven times a day for outgoing calls. The gross earnings for 1913 were $16,274,602, compared with $14,538,399 in 1912. Other figures from the earnings statement for 1913 are as follows: Operation expenses, $6,620,413; current maintenance, $2,581,391; depreciation, $2,608,530; taxes, $858,300. Deducting the sum of these items leaves $3,605,968 as the net earnings for the year. From this was paid bond interest and 8 per cent dividends on $27,000,000 of capital stock.

Camden Has New Pole Tax

A license tax of 50 cents a year has been laid by the Camden, N. J., council on each pole used by electric light, telephone and telegraph companies within the city of Camden. The law gives each company ten days in which to submit a sworn statement of poles and pay the tax. After this year the tax will fall due on the first day of each January. In addition each company is required to secure a permit from the city before erecting additional poles, and to pay the tax of 50 cents for each new pole. For violation of the ordinance a fine of from $5 to $25 is imposed.

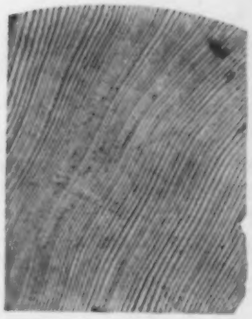
Coarse Grained Red Fir.

Douglas Fir Cross Arms

A Few Picturesque and Practical Features of the Industry

BY F. B. SCHAFER

MANY centuries have passed in the growth of the virgin forests of Washington. Towering toward the heavens, straight and massive, the giant fir trees cluster close together and vary from three to six hundred years in age.



Fine Grained Yellow Fir.

Before the introduction of the telephone and telegraph this vast expanse of timber remained almost unmolested; today, lumber camps and saw mills are continually taking out these ancient landmarks in order to assist in supplying the gigantic demand for poles and crossarms in telephone and telegraph line construction.

On the western slopes of the Cascade mountains, at the foot of Mt. Rainier, grow the fine-grained yellow Douglas fir trees which are claimed to be the best wood yet found to withstand destructive action caused by weather conditions—storm, sleet, wind, sand and especially the tension and vibration of the wires during these trying periods.

Exposed to the elements, the yellow fir has proven its tensile strength to be sufficient to withstand the powerful influence created by atmospheric changes during the various seasons. Intense heat of summer with its usual effect of drying up the sap in the pores of the wood, the sleet and rain of winter months with a resulting freezing and immediate expansion, all have been unable to cause any deterioration of the yellow fir. In fact, the full span of the actual life of the fir crossarm cannot be accurately determined owing to the fact that yellow fir was not used for this purpose prior to the years 1860 to 1865; and after inspection of numbers of these original installations their present condition shows them to be in splendid serviceability.

An interesting installation of yellow fir crossarms is that put into service in 1869, on the line of the Western Union Telegraph Company in the state of Nevada. These arms (3 foot, 2 pin arms) after forty-three years of continuous service were inspected and found to be without any signs of rot or decay. The York Telephone Company of Pennsylvania erected in 1892 fir crossarms which are still in service. Hundreds of instances might be cited where the yellow fir has been exposed for many years with practically no depreciation in lasting qualities. The only factor which has ever been able to create a condition of deterioration is the sand storm. Where cross arms have been erected in desert regions the constant spray of sand particles has, after many years, reduced the original size and shape of the arms, yet never sufficiently to cause any serious effect.

The American Cross Arm Company's Mill at Mt. Rainier.

From the standpoint of durability this excellent timber, light in weight yet of exceptional strength secures its lasting qualities from its closeness of grain. Of Douglas fir there are two types—red fir and yellow fir. These two types are not foreign, but on the contrary may often be found in the same tree. The red fir is usually a wood of rapid growth and less compact, which makes it relatively weak. Yellow fir is the fine-grained portion which is obtained from the outer section of mature trees. The photograph of cross sections gives a clear conception of the two types. In the yellow fir the rings average from twelve to sixteen per inch. These rings act as reinforcements and furnish this wonderful strength and

Some of the Big Sticks of Douglas Fir Used in Making American Cross Arms.

durability. In the manufacture of crossarms, Douglas fir is especially adaptable because of its straight grain free from knots and crevices. The fact that the trunk grows very high before branching allows an enormous section clear and without defects.

The toughness and extraordinary strength of fir crossarms was well displayed during the recent Ohio storms and floods. Poles were broken and wires became entangled yet in no instance was a fir cross arm found broken, and in some cases the entire weight of broken poles and attached wires was hanging on the arms.

Telephone and telegraph service of recent years has become a necessary element in the affairs of our nation; and in the preservation of this service Douglas crossarms have successfully withstood the forces of nature during those crucial moments which threatened to demolish every work of man which was not as solid as the proverbial rock.

Decision in Johnstown Case

At Ebensburg, Pa., was filed the decree of Judge Thomas J. Baldrige of Blair county dismissing the preliminary injunction granted the Central District and Printing Telegraph Company and others of that corporation. In this suit it was alleged that the Johnstown Telegraph Company had conspired to prevent the Bell company from doing business.

There is much in Judge Baldrige's opinion that is not of interest. High lights in the decree, however, are as follows:

We are not interested in the inquiry as to which company suffered the more, or whether the methods were entirely ethical. We are confined to the inquiry as to their legality.

Trade competition is lawful, even if it does cause damage, if it is without the violation of right.

An act may be hurtful to one's business, but not unlawful. If plaintiff company's business was affected, it was the natural, if not unavoidable, result of competition incident to this campaign. The plaintiff has no right of protection against lawful competition, but it does have a right of protection against wanton and malicious interference and injury to their business.

If without wrongful motive, the acts of one person's interference with the property or privilege of another is to serve some legitimate right or interest of his own, he may do the acts himself or cause other persons to do them that injuriously affect a third party so long as no definite legal right of such third party is violated.

But we cannot say in the present case that the principal object of the defendant was not to benefit their company, but maliciously and wantonly injure the plaintiff company's business. The immediate purpose of the defendant's aggressiveness was to advance their company's interests; the ultimate effect may have resulted injuriously to the plaintiff company, but that does not make their act unlawful.

It is urgently maintained that the action upon the part of the merchants in refusing to receive "local orders," indicated that there had been formed a boycott for the purpose of injuring the plaintiff. We do not so conclude.

The illegality of a boycott has been firmly established by a long line of decisions. If, therefore, the defendants in an obnoxious manner had the plaintiff company ostracized in a business sense they are entitled to relief. The merchants had a perfect right to agree that they would use the lines of the plaintiff company for one kind of service and the lines of the Johnstown Telephone Company for another character of service. Such conclusions were reached for reasons of economy and convenience. One or more of the merchants were financially interested in the Johnstown Telephone Company, which was an ample, but not unlawful reason for such action. This contract was an exercise of a right which they possessed and was not unjust or oppressive to plaintiff company.

There was no testimony to support the position that the agreement among the merchants was entered into through the inducement of the defendants or any of them. It was prepared by the attorney for the Penn Traffic Company and signed voluntarily by the parties for reasons which to them seemed advantageous to their interests.

A careful consideration of the case has not convinced us that the plaintiff is entitled to the relief sought. The motion to dismiss the bill and dissolve the injunction is hereby granted.

This cause came on to be heard, was argued by counsel, and after due consideration, it is hereby awarded, adjudged and decreed, that the injunction heretofore granted be, and hereby is, dissolved, and the bill in equity is hereby dismissed.

The prothonotary is directed to file this opinion and enter judgment nisi, under court rules No. 63 and 64, and give notice to the parties, or their respective counsel.

Mountain State's Official Approves Commissions

At the annual meeting of the Mountain States Telephone and Telegraph Company, held at Denver February 10, the announcement by President Field that he is in hearty accord with the plan of the control of his company by state utilities commissions elected by the people created much interest. Four of the seven states in which the company operates—Arizona, New Mexico, Idaho and Montana—have now provided for such commissions. President Field made this statement in commenting on the company's experience with the commissions:

"We find that regulation by public service commissions may be considered an assurance of better feeling and an insurance against unwarranted prejudice."

During 1913 the company increased its subscribers stations by 19,514, and its change and toll line increase for the same period shows 32,047 miles. The company's financial condition is excellent.

Division General Manager A. H. DeNike of Salt Lake City and General Plant Superintendent McCarn of Denver are on a tour of inspection in Utah and Idaho to determine necessary improvements for the year. New cables and a new plant costing $80,000 are planned for Pocatello, and a new building is planned at Eureka, Utah. Tentative plans also include a $65,000 building at Murray, Utah.

Within thirty days the new No. 8 copper circuit between Denver and Salt Lake will be completed and in service, giving the best equipment possible and the equal of any other in the country.

Commission Deadlock on New York Appraisal

A deadlock exists in the New York Public Service Commission, Second district, on the question of appraising the properties of the New York Telephone Company, one of the preliminaries in the telephone investigation.

The commission, which consists of four members, stands two and two on the question of whether or not an order should be entered directing an immediate appraisal of the properties of the company.

The outcome of the deadlock may be the removal of Commissioners Hodson and Sague, who are opposed to an immediate appraisal of the telephone company's property. Governor Glynn declared that he would get some action out of the commission immediately or something would happen.

Chairman Martin L. Decker said that he would proceed with the commission's part in the appraisal, despite the objections of the two associate members, in the belief that the new public service commissioners to be appointed by Governor Glynn would sustain this action.

Telephone Measurements by A. C. Potentiometer

A Study of Transmission in Cables; from the London Electrician

BY C. V. DRYSDALE

WITHIN the last few years the question of transmission of telegraphic and telephonic signals in cables has come into greater and greater prominence, and much has been done in developing the theory of transmission under various conditions. The experimental investigation has here lagged somewhat behind theory, and it is only comparatively recently that satisfactory methods of test have been devised.

When the alternate-current potentiometer was first devised it was pointed out that it should prove a very suitable instrument for cable investigation of all kinds; and experiments made some time ago on telegraphic cables at the frequency of ordinary alternate-current supply, amply confirmed this opinion. It is only within the last few months, however, that opportunities have been available for testing the instrument at telephonic frequencies, and it was at once found, as anticipated, that it was quite satisfactory in operation at any frequency up to 2,000 ~ per second.

PRINCIPLE OF THE POTENTIOMETER.

As comparatively little has been written about the alternate-current potentiometer since its inception, it may be well to briefly recall its principle, which is that of balancing any sinusoidal alternating potential difference to be tested by a potential difference of equal magnitude and phase derived from the potentiometer. This is attained by feeding an ordinary potentiometer (wound with coils of the smallest possible inductance and capacity) with current derived from the secondary of a phase-

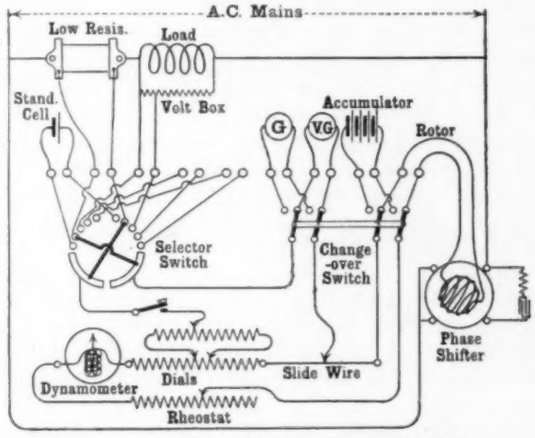


Fig. 1.—Principle of D. C.-A. C. Potentiometer.

shifting transformer, which turns in a rotating field generated from the supply mains by "splitting the phase."

The movement of the ordinary potentiometer slides alters the magnitude of the potential difference between them in the usual way, while the turning of the secondary of the phase-shifting transformer through any given angle alters the phase of the potential difference by precisely the same angle. In order to obtain the magnitude and phase of any alternating potential difference it is, therefore, only necessary to balance it in the same manner as in the case of a direct potential difference, except that a vibration galvanometer, telephone or other alternate-current detector is substituted for the ordinary galvanometer, and that balance is secured by the two processes of turning the phase-shifter secondary as well as altering the potentiometer slides. As soon as balance is obtained the potential difference to be measured is read off both in magnitude and in phase, or as a vector, by the indications of the potentiometer and phase-shifter dials, Alternate-current measurement in general may be likened to surveying, and the alternate-current potentiometer is a surveying outfit in which the coils and slide wire correspond

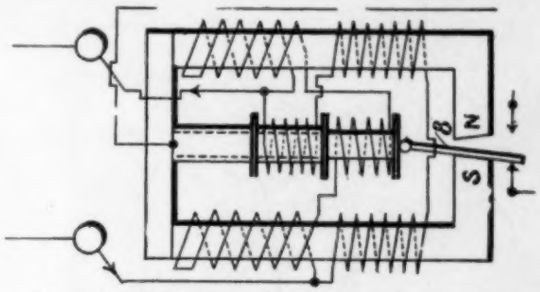


Fig. 2—Actual Connections of D. C.-A. C. Potentiometer.

to the measuring chain or tape, and the phase-shifter to the compass or theodolite.

Figs. 1 and 2 give skeleton diagrams of the connections, which, although somewhat complex at first sight, are in reality very simple. In the middle of the case is the potentiometer proper, consisting of two dials reading to 0.1 and 0.0- volt respectively, with a slide wire for finer subdivisions, and the usual regulating rheostats. On the right of this potentiometer is the phase-shifting transformer, supplied from the mains used in the experiment, with the aid of a condenser and resistance for splitting the phase, and thereby producing a pure rotating field. Symmetrically placed with respect to this on the left of the potentiometer is the mil-ammeter, which indicates when the normal direct or alternating current passes through the potentiometer. The instrument is provided at the back with five pairs of terminals for connection to the standard cell and to any circuits to be tested, through a selector switch; while there are four pairs of terminals for connection to the accumulator, the rotor of the phase-shifting transformer, an ordinary galvanometer, and a vibration galvanometer respectively. The change-over switch at the back right-hand corner, by a single movement, connects the potentiometer either for direct-current of alternate-current measurement, for frequencies from 25 ~ to 1,000 ~ per second.

Careful tests have shown that with ordinary supply frequencies the readings may generally be relied on to within 0.1 per cent in the magnitude and 0.1 deg. of phase angle. In order to facilitate any calculations from the readings of the potentiometer, the dial of the phase-shifting transformer is divided both in degrees and in cosines, and two pointers at right angles are provided. One of these pointers, therefore, indicates the vectorangle ϕ, and cos ϕ, while the cross pointer gives sin ϕ on the cosine scale. This gives the rectangular components of the vector, or the resistance and reactance components of a circuit, with great facility.

MEASUREMENTS ON TELEGRAPHIC CIRCUITS.

The first cable measurements were made in November, 1910, by H. Tinsley, who constructed an artificial cable corresponding to a submarine cable of 240 nautical miles, having a resistance of 6 ω and a capacity of 0.3 mfd. per naut, or a total K. R. of 0.104. The insulation resistance was 100,000 megohms per naut, so that the leakance could be neglected. For the test the cable was supplied with alternating current at a frequency of 50 ~ per second, and the potential difference and current were measured by the potentiometer at intervals along the cable. The potential difference was measured directly,

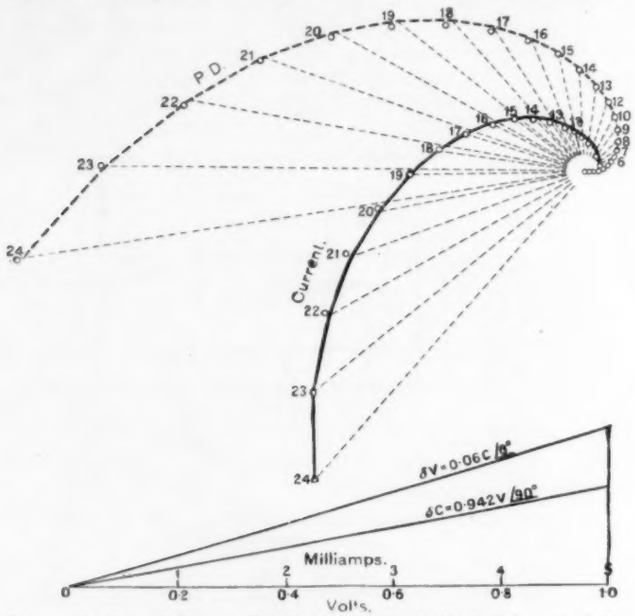


Fig. 3.—P. D. and Current Distribution in an Artificial Telegraph Cable. 240 nauts, 6 w, 0.3 mfd. per naut. KR=0.104. Frequency 50 ~ per sec.

and the current obtained by measuring the drop across each 6 ω resistance. The experimental results are given in Table I.

In order to compare the experimental results with the theory, we may either regard the cable as a continuous one, or, rigidly, as being made up of a succession of resistances and condensers. Taking the first course, we have the following:

Resistance per naut, $r=6\omega$; capacity$=0.3\times10^{-6}$ frd.

Impedance per naut at 50 ~, $I=6\omega$; admittance $Y=Kp=94.2\times10^{-6}$ mho.

Sending end or characteristic impedance, $Z_o=\sqrt{\frac{I}{Y}}=252.5\omega\ \angle 45°$.

Attenuation constant, $x=\sqrt{IY}=0.01681+0.01681j$ $=0.0265\ \angle 45°$.

Impedance of receiver, $Z_r=O$.

$$\text{Impedance at sending end } Z_1=Z_o\frac{\frac{Z_r}{Z_o}+\tanh La}{1+\frac{Z_r}{Z_o}\tanh La}$$

$=Z_o \tanh La$.

For 240 miles, $La=6.36$, and $\tanh La=1.000$.

Hence, $Z_1=Z_o=252.5\omega\ \angle 45°$.

Comparing these results with the experimental ones, we have Z_1 at 240 nauts $= 272.3\omega\ \angle 40.1°$, as against $252.5\omega\ \angle 45°$ just calculated. The discrepancy, as will be seen later, is due to the non-uniformity of the cable, the measurement being taken just before the addition of another condenser, which would both diminish the impedance and increase the angle of lag.

As regards attenuation, the last five experimental values of the potential difference, and also of the current, give a mean ratio of each measurement to the preceding as 1.186 and the mean angle of phase rotation as 9.43°

Resistance per naut, 6 ω; capacity per naut, 0·3 mfd.; inductance and leakance negligible; frequency 50 ~ per second; receiving end earthed.

Distance from receiving end. Nauts.	P.D. volts observed.	Current milliamperes observed.	Impedance ohms. Z.
0	0	...	...
10	0·0076 /0	0·130 /0	58·5 ∠0
20	0·0162 /1·5°	...	...
30	0·0248 /4·6°	0·130 /3·8°	187·0 ∠0·8°
40	0·0335 /8·2°	...	...
50	0·0423 /12·8°	0·140 /23·8°	302·0 ∠11·0°
60	0·0514 /18·7°	...	...
70	0·0612 /25·6°	0·183 /52·0°	335·0 ∠26·4°
80	0·0724 /33·5°	...	...
90	0·0828 /42·3°	0·261 /81·5°	317·0 ∠39·2°
100	0·0996 /51·9°	0·3116 /96·2°	320·0 ∠44·3°
110	0·1170 /62·2°	0·383 /104·3°	305·0 ∠42·1°
120	0·1371 /72·4°	0·4516 /115·3°	304·0 ∠42·9°
130	0·1620 /82·8°	0·5616 /125·4°	298·0 ∠42·6°
140	0·1924 /93·2°	0·675 /134·9°	285·0 ∠41·7°
150	0·2275 /103·4°	0·816 /144·3°	279·0 ∠40·9°
160	0·2706 /113·9°	0·973 /153·6°	278·0 ∠39·7°
170	0·3203 /124·0°	1·166 /162·4°	274·5 ∠42·4°
180	0·3824 /133·8°	1·39 /171·6°	268·0 ∠37·8°
190	0·4543 /143·0°	1·663 /180·8°	273·0 ∠37·8°
200	0·5373 /152·1°	1·978 /190·1°	272·0 ∠38·0°
210	0·6392 /161·3°	2·361 /199·3°	270·3 ∠38·0°
220	0·7576 /170·4°	2·800 /209·0°	270·8 ∠38·6°
230	0·8973 /179·7°	3·300 /219·0°	272·1 ∠39·3°
240	1·0653 /188·9°	3·916 /229·0°	272·3 ∠40·1°

for 10 nauts. Taking the natural log. of the ratio, we have

Attenuation constant by experiment 0.1705
Phase rotation 0.943° per naut
Attenuation constant by theory 0.1681
Phase rotation 0.962° "

$$\text{Velocity of propagation}=\frac{360}{0.95}\times0.50=19{,}000 \text{ nauts per second.}$$

The agreement is here fairly close, the reason being that the want of uniformity of the line affects each successive reading in nearly the same manner. The separate condensers were only adjusted within an accuracy of 2 per cent.

Professor Fleming, who took a great deal of interest in these results, in conjunction with his recent lectures on cable transmission, also worked out some of these values, and found the agreement fairly satisfactory.

In order, however, to check the results by theory as closely as possible, the author worked out the polar curves of potential difference and current by a step-by-step graphical method, and the diagram (Fig. 3) shows these curves, with the experimental observations marked thereon. The agreement is fairly close on the whole, and the impedance at 240 nauts comes out as follows:

By diagram, $273.2\ \angle 40.1°$; by experiment, $272.3\ \angle 40.1°$.

The two results, therefore, coincide to about 0.3 per cent

in the magnitude and 0.1° in the phase angle, which must be regarded as decidedly satisfactory.

MEASUREMENTS ON TELEPHONE CABLES.

Preliminary experiments made at the Pender laboratory by the courtesy of Prof. Fleming having shown that the potentiometer designed for ordinary supply frequencies worked equally well at a frequency of 1,000 ~ per second, Mr. Tinsley proceeded to procure a Duddell high-frequency alternator, and to make up an artificial telephone cable to the specification of the P. O. standard 20 lb. cable. This cable has a resistance of 88ω, a capacity of 0.054 mfd., and an inductance 0.001 henry per loop mile; and the artificial cable was made up according to the accompanying diagram (Fig. 4).

TABLE II.—50-MILE ARTIFICIAL P. O. STANDARD TELEPHONE CABLE.

Resistances, 88·4 ω; capacity, 0·054 mfd.; inductance, 0·001 henry per loop mile. Leakance, negligible; frequency, 1,000 ~ per second. Receiver, telephone of 380 ω resistance and 0·067 henry inductance.

Distance from receiving end. Miles.	P.D. volts. V.	Drop over 42 ω resistance.	Current milliamperes. C.	Impedance ohms. $I=\frac{V}{C}$
0	0·4507 /47·6°	...	0·800 /0°	563 /47·6°
1	0·4615 /47·4°	0·0345 /5·9°	0·822 /6·05°	562 /41·35
6	0·780 /41·7°	0·0390 /82·1°	0·895 /83·0°	872 /41·3°
11	1·1596 /69·2°	0·0937 /125·0°	2·200 /124·7°	527 /55·5°
16	*1·871 /112·1°	0·1750 /157·1°	4·16 /157·1°	450 /45·0°
21	*3·474 /148·0°	0·3095 /193·0°	7·35 /193·0°	473 /45·0°
26	*6·393 /184·3°	0·5692 /231·5°	13·53 /231·5°	472 /47·2°
31	*11·717 /222·8°	1·0578 /268·3°	25·15 /268·3°	467 /45·5°
36	*21·32 /259·0°	*1·900 /307·9°	45·20 /307·9°	472 /48·9°
41	*38·83 /295·0°	*3·305 /339·0°	78·70 /339·0°	493 /44·0°
46	*70·10 /331·0°	*5·984 /375·8°	142·1 /375·8°	493 /44·8°
50	*129·7 /365·0°	...	...	...

*In these measurements a box of 25,000 ω resistance was employed.

The potential difference was in each case measured at the condenser terminals, while the current was obtained by measuring the potential difference across the 42ω coil immediately preceding it. The alternator was run at 4,000 revolutions per min., giving a frequency of 1,000 ~ per second, and the speed was measured and kept constant by the aid of a stroboscopic disc and tuning fork with very narrow slits, which was found to be quite effective for speeds up to 7,000 a minute or more. The following table shows the results obtained.

Comparing the results with theory, as in the case of the telegraph cable, we will first treat the cable as being continuous.

We then have $p=2\pi n=6{,}284$.

Impedance $I=88.4+6.28j=88.6\ /4.07°\ \omega$ per mile.

Admittance $Y=0.000339j=0.000339\ /90°$ mhos per mile.

Characteristic impedance $Z_o=\sqrt{\frac{I}{Y}}=511\ \angle 43°\ \omega$.

Vector attenuation constant $a=\sqrt{IY}=0.118+0.128j$.

Giving an attenuation constant of 0.118 and a phase rotation of 7° 18′ per mile.

Impedance of receiver $Z_r=563\ /47.6°\ \omega$.

$$\text{Impedance at sending end } Z_1=Z_o\frac{\frac{Z_r}{Z_o}+\tanh La}{1+\frac{Z_r}{Z_o}\tanh La}$$

At 50 miles $La=5.9$ and $\tanh La=1$.

Hence, $Z_1=Z_o=511\ \angle 43°\ \omega$.

By experiment we have

Z_1 at 46 miles$=493\ \angle 44.8°$.

The difference, as in the former case, is due to the abrupt steps in the line.

For the last five intervals of 5 miles each the mean ratio of increase of potential difference and current is 1.81, and the phase angle 36.4°, which gives an attenuation constant of 0.1179, and a phase rotation of 7° 13′, as compared with an attenuation constant of 0.118 and a rotation of 7° 15′ by theory. The velocity of propagation works out at 49,500 miles per second. As in the case of the telegraph cable, this agreement is very close.

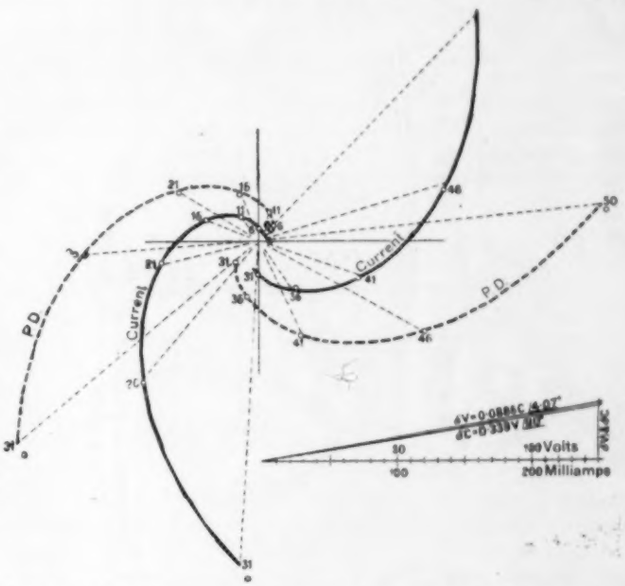


Fig. 5.—P. D. and Current Distribution in an Artificial Telephone cable. 88 ω, 0.054 mfd, 0.001 henry per loop mile. Frequency 1,000 ~ per sec.

In Fig. 5 we have a polar diagram for the distribution of potential difference and current in the cable, worked out by the step-by-step graphical method; and upon the same diagram the results of the actual measurements, given in Table II, are plotted. As the attenuation in this case is very considerable, the readings for the first 31 miles have been plotted to ten times the scale of the succeeding ones. It will be seen that the bulk of the observations are in very close agreement with theory, when the latter is applied to the actual case of a non-uniformly distributed line. A few of the observations show distinct departures from the theoretical curve, and this may have been due to errors of observation; but it may more probably have been due to small variations in the capacity of the condensers forming the line. In any case, the discrepancies are quite irregular, and show no sign of real difference between theory and observation, except perhaps to a small extent at the receiving end of the line, where the potential difference and current are very small. This may be attributed to the fact that with a high supply voltage and frequency the capacity of the various parts of the apparatus cause currents to flow which slightly affect the potentiometer readings. These reduced to a considerable extent by the use of what the author has termed a filter transformer—*i. e.*, a transformer especially constructed to have a small capacity between the windings. This enables the circuit under test to be more effectively isolated from the potentiometer.

The foregoing investigations, therefore, show that the alternate-current potentiometer is quite suitable for investigations on cables at any frequency between 50 ~ and 1,000 ~ per second, and there is no reason to suppose that it would not be equally effective for either lower or higher frequencies.

POSSIBLE APPLICATION TO WIRELESS TELEGRAPHY.

In conclusion, it should be pointed out that there is no necessary limit of frequency to the operation of such an instrument so long as continuous oscillations are being dealt with; and as these are now coming more generally into use for wireless telegraphy, it is quite possible that the alternate-current potentiometer may be useful in this sphere also, and developments are proceeding in this direction. Of course, for very high frequencies the dynamometer must be replaced by a hot-wire instrument, the potentiometer coils by absolutely straight resistances, and the vibration galvanometer by a wireless detector, while the phase-shifting transformer will be coreless in order to avoid unduly high inductance. Properly speaking, the

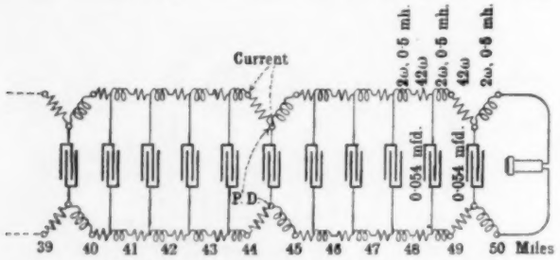


Fig. 4.—Artificial P. O. Standard 20 Lb. Telephone Cable.

measurements of potential difference or current would only have a definite meaning in the case of continuous or undamped oscillations; but, even with trains of damped oscillations, inductance, capacity and phase measurements ought to be satisfactory, as well as measurements of the average power employed. Again, it ought to permit of the distribution of intensity of the radiation and its direction to be determined with considerable accuracy, which should be a valuable help in practical work. On the theoretical side it appears probable that actual measurement of the wave-length and velocity of propagation could be made without employing resonance or interference methods; while experiments on absorption, refraction and reflection of such radiation ought to be made with much greater accuracy. The accuracy and range of the alternate-current potentiometer has so far proved greater than the writer at first thought possible, and it has already shown itself capable of measuring currents and voltages from a milliampere or millivolt to thousands of amperes or volts at frequencies from 25 ~ to 2,000 ~ per second, as well as direct current; self or mutual inductance and capacity; magnetic measurements; and telegraphic and telephonic transmission tests. If it can also be applied to wireless measurements, almost the whole field of direct and alternating-current testing will have been covered by it.

Dynamite was used before the rains to dig telephone pole holes at Maryville, Mo. The ground was unusually hard and so many shovel and pick handles were broken that it was decided to resort to the explosive. G. R. Eaton, foreman of construction for the telephone company, did the work. Half a pound of dynamite was used for each hole. The only trouble with the method was that it was hard to find enough dirt to tamp about the poles after they had been set.

Vibration of Telephone Diaphragms in Wireless

No wireless waves, either continuous or non-continuous, make the telephone diaphragm vibrate to the wave-frequency. In the first place, says the *Wireless World*, no diaphragm has yet been made which would vibrate at the rate of fifty thousand per second—the wave frequency of the slowest waves in use—and, in the second place, the impedance offered by the coils of the telephones to alternating currents of such frequencies would be so great that the current passed would be too small to operate the telephones. This is where the "detector" comes in, performing the function of rectifying the oscillating currents into pulses of unidirectional current. These pulses are used to charge up the telephone capacity, and this discharges through the telephone coils. In the case of non-continuous waves, which are sent out in wave-trains either separated by periods of inactivity, or waning to zero and then increasing again, each wave-train is converted by the detector into a group of uni-directional pulses, which add up in the telephone-capacity, and then, discharging through the telephone-coils, produce a single movement of the diaphragm. Thus each wave-train produces a movement of the diaphragm, and the several trains, which form a "dot" or "dash," following each other—in the case of the modern Marconi discharger—at perfectly regular intervals, produce a musical note in the telephone. The truly continuous wave, on the other hand, has no succession of "trains." From the moment the transmitting key is pressed, to the moment when it is again raised, the uni-directional pulses delivered by the "detector" remain at a dead level. The telephone diaphragm gives one "click" when the key is pressed, and one more when it is raised, but no note is produced in between. If, however, the continuous waves are split up by some means into regular groups, then, of course, each group produces a movement of the diaphragm, and a musical note results. Thus the "breaking up" does not cause each group to have only one effective wave, but enables the detector to deliver a large number of effective groups of uni-directional impulses instead of only the one produced by the pressing and raising of the transmitting key.

Telephone Girls Receive Bonus

The Providence (R. I.) Telephone Company has notified its operators at the various exchanges that those who have been in the company's service two years or more will receive a bonus on the anniversary of each year's service. While the plan became effective December 1, those who have already rounded out two years receive a sum of money.

Operators who have served two years receive $25 on the anniversary of their entering the company's employ. On the third anniversary they will get a similar sum, and at the end of four years the gift will be increased to $50. Then they will get $50 for each year they remain.

There are many operators who have already been with the company more than four years, and on the anniversary will receive the gift of $50. A large number have seen two or three years service.

The company's purpose is to keep the operators interested in the work. It takes some time for a telephone operator to become efficient, and the telephone company officials desire to keep experienced operators as long as possible.

Development of Railway Telephone Service

A Brief Account of the Progress of the Art Up to the Present Time

BY JOHN A. KICK

ONE cannot yet imagine the completeness of the telephone systems of communication on the railways ten years hence, unless the present system of the Pennsylvania Railroad in the Altoona district be accepted as one nearly approaching perfection; and there is reason to doubt if its present comprehensive scope is more than introductory.

It is difficult to find words to voice the opinions of an enthusiast, and it is entirely impossible even to assume a basis for comparison with the methods of yesterday and do real justice to the systems of today. The wildest guess ten years ago on the completeness of the present-day railway systems of communication, would be only a weak effort and not worthy of a student of progress to use as a basis for computing the next ten years advancement.

Only about thirty per cent of the railway mileage is now dispatched by telephone, and while this is the results of only about seven or eight years development and perhaps a precedent in the acceptance of an improved utility, yet the fact that only a very small mileage is equipped with message and commercial telephone service indicates the possibilities for the future.

It can scarcely be conceived that radical changes will be made in the systems of signaling as they are applied, nor does it appear probable that a much higher efficiency factor in voice transmission will be produced. However, there may be perfected an applicable and practical means for using higher power voice transmission which will result in its acceptance as solving the problem of the loud speaking telephone train dispatching system.

While worthy of noting in passing, yet these are only incidentals to the factor of education which is most necessary to the increase of these systems as the important elements are, first, its utility; second, its practicability; third, its value in relation to cost; fourth, its acceptance; and fifth, its financing.

The first two elements are settled and so well known as to be considered no longer of dispute, but the third is not always so easily proved to any one who demands statistical evidence, which is no nearer of production in a convincing form than at the beginning.

Acceptance of the utility as one of value frequently suggests reason for and a means of financing; hence the importance of the educational factor.

Failure to finance is in some cases a severe impedance to progression, but in the main this factor has not been so serious as materially to retard the growth of the systems.

Simplex circuits superimposed on selective signaling circuits have furnished excellent duplex telegraph service, and on short lines acceptable quadruplex service. Printing telegraph systems have been placed in service on these simplex circuits, and in general the tendency has been toward the full use of the wires.

Phantom telephone circuits on parallel selective signaling circuits have been utilized in limited numbers owing to the necessity of careful design of transposition systems to be fully effective.

The transposition systems are being gradually improved by reason of observation on working systems. The result of the year's work is convincing that these phantom circuits are very valuable utilities when properly engineered and the results carefully applied.

It has been established that on two selective signaling circuits the phantom transposition sections are best established as between each two permanent telephone stations and as multiples of the standard section.

Accepting a standard transposition section as being of 8 miles, then a derived section between two telephone stations 5 miles apart would be based on 5/8 of all standard measurements, that is, 5/8 of 1,300 feet, etc. A devoid section between two stations 10 miles apart would be 10/8, and so on, thus bringing the bridges or loops at a section terminating point.

Investigation has been made of the practicability of using selective signaling apparatus for controlling various train directing semaphore mechanisms and with results to justify further research.

During the past year several selective signaling systems have been changed in some details, but the fundamentals are practically as before with the result that the changes are productive of claims of additional marginal values without complete redesign. Some novel and more or less practical accessories were developed, but not of such consequence as to attract unusual notice. All of the developments were simple applications of mechanisms and circuits previously known to the art, and are novel only in their application.

One of the most noticeable developments of the year is that of the improved standards of railway telephone and telegraph systems, both in the class of equipment and its installation.

The meeting of the Association of Railway Telegraph Superintendents was the most successful and best attended of its history, indicating the degree of interest in the educational advantages of these meetings, and the importance of exchange of practical ideas.

During the year many railways made arrangements for emergency protection, such as emergency cables, coils of wire and instruments to insure prompt action in restoring interrupted service.

These arrangements are not so much an indication of the increased importance of the system of communication as they are a general recognition of the vital importance of communication—which has always been important, but not always so recognized.

The future for these systems is no greater in prospect than is that of the officials and engineering forces engaged, and it is to be hoped that inventive genius will not be neglectful of these systems.

Telephone Company Giving Lectures

A series of lectures is being given by the Bell Telephone Company to the various schools and clubs of Scranton, Pa., and other eastern cities, showing the growth and perfection of the great telephone industry. The lectures are largely attended and prove interesting and instructive. The lectures are illustrated by stereopticon views.

Inductive Interference in California

Second Progress Report of the Committee of State Wire Interests

SINCE the last progress report (Telephone Engineer, November, 1913), the Joint Committee on Inductive Interference, authorized by the California State Railroad Commission, has given a great deal of consideration to the analysis of results obtained from the several parallels on which an investigation has been conducted, together with the preparation of a program of work to be carried out by the committee in the immediate future.

The parallels concerned in this study are described in the last progress report from the committee. The principal exposures are, briefly, two parallels (20 miles and 8 miles), between the 57,000 volt 3-phase line of the Sierra and San Francisco Power Company and the main coast line toll lead of the Pacific Telephone & Telegraph Company between San Francisco and Los Angeles. In addition to the telephone lead, circuits of the Western Union Telegraph Company are paralleled by this line in portions of its length. The high tension line in question is supplied by autotransformers at the Gaudalupe substation and supplies 33,000 volt and 22,000 volt lines of the Coast Valleys Gas & Electric Company through autotransformers at Salinas. South of Salinas, the above mentioned telephone lead is paralleled by the 33,000 volt line of the Coast Valleys Gas & Electric Company for a distance of 41 miles between Salinas and King City. The telegraph circuits of the Western Union Company are also exposed to this high tension line. In all cases the power and telephone lines are on opposite sides of a public highway. The Sierra & San Francisco Power Company operates with a grounded neutral. Tests were made under conditions of grounded and non-grounded neutral of the star-connected auto-transformers at Salinas. There are no grounds beyond Salinas in the 33,000 volt and 22,000 volt lines supplied by these transformers.

The mass of experimental data and the studies concerning these exposures are embodied in some 30 technical reports. Some of the general results and conclusions indicated by a study of these reports are as follows:

The fundamental (60 cycle), wave of voltage or current is relatively of little importance in the production of noise in telephone circuits. It becomes of importance, however, if it gives rise to longitudinal voltages of sufficient magnitude to constitute a physical hazard, to interfere with the operation of grounded signalling devices or superimposed telegraph service, or to operate protective apparatus on the circuits.

The harmonics of the voltage and current waves are of chief interest as the cause of noise in telephone circuits, particularly the higher harmonics or those within the range of the voice frequencies.

The fundamental and lower harmonics are important as disturbing factors in telegraph circuits.

The above facts show clearly the great desirability, from the standpoint of inductive interference, of having wave forms of voltage and current in power circuits free from all harmonics. That such does not obtain in the present state of the art is a basic cause of the disturbance to communication circuits paralleled by power circuits. Further than this these facts emphasize the desirability that designers and manufacturers eliminate, as far as is practicable, these features of design favorable to distorted wave forms.

In order to facilitate the analysis of the inductive effects of a power circuit on parallel communication circuits, the voltages and currents of a 3-phase power system can be conveniently regarded as made up of components which exhibit distinct characteristics and treated separately. In any 3-phase system in which the three voltages between pairs of wires are equal in magnitude the voltage between any wire and ground can be considered to be the vector sum of two voltages which are called the balanced and the residual components respectively. The balanced components consist of three equal voltages between the three wires and ground, the vector sum of which is zero. The residual components consist of three equal voltages between wires and ground which are in phase with each other. The residual voltage of the system is defined as the vector sum of the voltages of the three conductors to ground. It is, therefore, three times the residual voltage of the individual conductors or three times the equivalent single-phase voltage of the three conductors in parallel with respect to the earth. The currents flowing in the three wires of a 3-phase circuit may be considered to be composed of three sets of currents, namely: (1) Balanced components consisting of equal currents in each of the three line wires whose vector sum is zero. (2) A single-phase current flowing in a loop composed of two of the wires. (3) A residual current divided equally between the three wires and returning through the earth. Residual current is defined as the vector sum of the three-line currents. It is, therefore, the equivalent single-phase current flowing through the three-line conductors in parallel with the earth completing the circuit. Connections of current and potential transformers are arranged for measuring the residual current and residual voltage of power circuits under investigation.

For the purpose of clearness, it is convenient to classify induction phenomena as longitudinal or transverse referring to their manifestation on a metallic circuit. Longitudinal induced voltage refers to the voltage induced between the circuit and ground in the case of electrostatic induction and along the circuit between the two ends of the exposure in the case of electromagnetic induction. The transverse induced voltage of a circuit is the difference between the longitudinal induced voltages of the sides of the circuit. In the case of electrostatic induction this voltage acts between the two sides of the circuit and in the case of electromagnetic induction it acts around the metallic circuit.

It has been found in the case of the power lines investigated that the fundamental 5th, 7th and 11th harmonics are prominent in the balanced currents and voltages while the fundamental, 3d, and 9th harmonics are prominent in the residual currents and voltages of the power system.

By a comparison of the prominent harmonics in the current and voltages of the power system with those of the induction in the telephone circuits it is evident that the longitudinal induction arises principally from the residual voltages and currents while the transverse induction shows principally the characteristics of the bal-

anced voltages and currents together with some effect from the residual voltage and current.

The effect of the condition of the neutral of the auto-transformers at Salinas, grounded or non-grounded in so far as the induction from these exposes is concerned, is through the residual currents and voltages of the several high tension lines connected to these transformers. A representative value of the neutral current at Salinas during the tests conducted at that point is 0.3 ampere. It is composed almost entirely of 9th harmonic together with the fundamental and 3rd harmonics, decreasing in magnitude in the order named. The length of the power circuit between Gaudalupe and Salinas is approximately a quarter wave length for the 9th harmonic. This fact may have some bearing upon its large magnitude and is to be further investigated by the committee. Under existing conditions with the power system in normal operation, grounding the neutral of the auto-transformers at Salinas does not greatly affect the induction in the exposures concerned. Two reasons may be given for this result: (1) the load balance on the power system is such that a relatively small amount of load current flows through the neutral, (2) as three high tension lines are connected together by the auto-transformers at Salinas, opening the neutral connection to ground of these transformers does not completely eliminate the path for the residual current of any one of the three lines, since it may then flow to earth through the admittance to ground of the other two lines. It is quite evident from these considerations that this case presents special conditions which make it impossible to draw general conclusions applicable to any other case. Further consideration of the effect of grounding this neutral will probably be undertaken by the committee with the idea of determining its effect under abnormal conditions.

The banks of star-connected auto-transformers at Guadalupe and Salinas substations are provided with closed delta secondary windings which supply power for local consumption. For test purposes the secondary delta of the transformers at Salinas was opened. A large increase in the residual voltage and residual current, with a consequent large increase in the induction in parallel telephone and telegraph circuits resulted. In all cases this increase applied particularly to the 3d harmonic. If star-connected auto-transformers are used, this test indicates, therefore, that from an induction standpoint it is beneficial to provide such auto-transformers with secondary windings connected delta.

On the eight-mile exposure it was possible to measure separately under different conditions of the telephone circuits the electromagnetic and electrostatic induction. For this exposure, also, computations of the magnitude of the induction, both electromagnetic and electrostatic, were carried out. In computations of electromagnetic induction, experience has indicated that the distances between wires and their images cannot be assumed to be twice the height of the wires above the ground. Special tests were carried out in order to determine the equivalent depth of the image conductors. The tests indicated this depth to be approximately 300 meters below the earth's surface. Due to the electrostatic shielding effect of neighboring objects it was found, also, that the computed electrostatic induction was greater than that actually observed, indicating that in effect the ground surface was brought nearer to the conductors. Electrostatic shielding of the circuits under test, by grounding other circuits on the telephone lead at one point reduced the electrostatic induction, particularly the longitudinal induction.

The effect of typical terminal apparatus of a telephone circuit in reducing the amount of extraneous current reaching the telephone receiver was the subject of some investigation. These effects vary with the length of the line and character of the induction.

As a means of minimizing inductive interference, some study has been given to the proper relative transposition of power and telephone circuits. Some of the considerations involved in this study are given in the portion of this report dealing with the future work of the committee.

The field engineering staff of the committee is now located at Santa Cruz and is investigating the parallel between the 22,000 volt 3-phase line of the Coast Counties Gas & Electric Company and a toll lead of the Pacific Telephone & Telegraph Company. This parallel is between Santa Cruz and Watsonville and is approximately 17 miles in length, the two lines occupying opposite sides of the public highway. The system of the Coast Counties Gas & Electric Company is isolated from ground. The high tension line involved in this exposure may be taken out of service when occasion requires and used for experimental purposes.

The committee plans to conduct on this exposure a series of tests for the purpose of determining the effectiveness of several different systems of transpositions of the power and telephone circuits. In considering transposition systems for parallel power and telephone circuits account must be taken of the effect of such transpositions on the different types of induction arising from the different components of the voltages and currents of the power system. The longitudinal induction arising from balanced voltages and currents can be made as small as desired by the insertion of a sufficient number of properly located power circuit transpositions. The longitudinal induction arising from the residual voltage and current of the power circuit is unaffected by power circuit transpositions except in so far as the magnitude of the residual voltage and current is affected by such transpositions. Transpositions in a power circuit tend to equalize the capacities of the three-phases to ground and, hence, reduce any residual voltage which may be due to inequalities in the capacities of the three conductors to ground. Residual voltages and currents give the same inductive effects as a single-phase grounded circuit operating with the three power conductors in parallel. For this reason residual voltages and currents, though small in comparison with the balanced voltages and currents, have proportionally a very large effect in producing longitudinal induction in nearby circuits. The longitudinal induction arising from either the balanced or residual voltages and currents is independent of the transpositions in the telephone circuits. The large inductive effects resulting from a relatively small residual voltage or current and the inability to reduce the longitudinal induction arising therefrom render highly desirable the elimination from the power system of such residual components of voltage and current. The transverse induction from residual currents and voltages can be reduced by transpositions in the telephone circuits which tend to equalize the induction into the two sides of the circuit by exposing each side equally to the effect of the power circuit. The transverse induction from balanced currents and voltages is affected by transpositions in both the power and telephone circuits.

The problem of designing transpositions to minimize

the inductive interference between parallel power and telephone circuits is further complicated by the elaborate transposition system of the telephone circuits which is designed to reduce the induction or cross-talk between different telephone circuits. In order to be most effective in reducing inductive interference, it is absolutely essential that the transpositions in the power and telephone circuits be located with due regard to each other.

By the experimental study of transposition systems being conducted at Santa Cruz, the committee hopes to be able to determine:

(a) The effect of power transpositions in reducing the longitudinal induction arising from balanced currents and voltages.

(b) The effect of telephone transpositions in reducing the transverse induction arising from:

1. Residual currents and voltages.
2. Balanced currents and voltages.

(c) The effect of power and telephone transpositions properly located with respect to each other in reducing both the longitudinal and transverse induction arising from balanced currents and voltages.

(d) The relative effectiveness of different transposition systems in reducing electrostatic and electromagnetic induction.

In its application to other exposures the information to be obtained from this experimental study will be chiefly of value in indicating the limits and refinements within which it is necessary to work and the accuracy with which the effectiveness of any proposed system of transpositions may be predetermined.

In addition to the study of the effect of transpositions, the committee will undertake in the near future to determine the effect of known amounts of noise (extraneous current) in the telephone receiver in reducing the intelligibility of conversation over a circuit. As the first step in this investigation, tests will be conducted to determine the detrimental effect of known amounts of single frequency extraneous current in reducing the intelligibility of conversation. This detrimental effect will be rated as the equivalent of an increase in the length of the circuit. From such tests with single frequency extraneous currents the relative detrimental effect of currents of different frequencies will be obtained. This, together with information as to the detrimental effect of currents of complex wave form, will give information by which the law of the combination of the single frequency effects can be obtained.

Until such time as the committee is prepared to make recommendations to the railroad commission, it feels at liberty to indicate only in the most general way the results of its investigation. Since its formation a year ago the work of the committee has served to emphasize to all members the magnitude of the problem under investigation and the necessity of a thorough consideration of the subject in all its different phases before the committee, in justice to itself and to the railroad commission of California can make final recommendation to that body for its action.

Just Telephone Sick Friends

"Keep away from homes where outbreaks of contagious diseases have occurred," said Dr. A. S. Alexander of the University of Wisconsin in a recent address. "Do your sympathizing by telephone, and then there will be less prospects that somebody will be called on to express sympathy with you."

Southern Bell System in Three Divisions

The Southern Bell Telephone Company, instead of handling all business in a general office in Atlanta, has established three divisions with a division general manager in each, and these managers will handle all matters originating in their several divisions and will report direct to the vice-president in Atlanta.

The new divisions with their division general managers will be as follows:

Atlanta division, M. O. Jackson, division general manager, headquarters Atlanta.

South Georgia and Florida division, David Laird, division general manager, headquarters Jacksonville.

North and South Carolina division, M. B. Speir, division general manager, headquarters Charlotte.

J. Epps Brown, vice-president of the company, will have his office in Atlanta. Through the division general managers he will keep in touch with the entire field organization of the company. The new plan contemplates a closer supervision of these large and growing field forces, which will mean more efficient service to the public.

The following transfers will be made incident to the change in organization:

F. E. Montague, T. L. Ingram and Macon Martin will be added to the staff of the vice-president.

J. R. A. Hobson will be assigned to the office of President W. T. Gentry.

D. F. Turnbull will come from Birmingham as commercial agent in the office of Division General Manager Jackson.

John L. Brown will be transferred to the same office as traffic superintendent.

The Cumberland Telephone and Telegraph Company, which was recently absorbed by the Southern Bell Company, at a regular meeting of its directors adopted the same form of organization as the Southern Bell.

The divisions of the Cumberland and their division general managers will be as follows:

Tennessee division, E. E. Bawsel, division general manager.

Kentucky division, F. L. Woodruff, division general manager.

Louisiana and Mississippi division, C. A. Stair, division general manager.

Transfers incident to the change of organization in the Cumberland will be as follows:

C. M. Nininger of Atlanta will go to Memphis as commercial superintendent.

J. C. Thompson, traffic superintendent in Atlanta, will go to Nashville as traffic superintendent.

Central Union Receivers, Ohio and Indiana

Receivers for the Central Union Telephone Company in Ohio were appointed in court February 2 on application of E. A. Reed. The suit followed similar action at Chicago because of an injunction which tied up the funds of the company. The court appointed the same receivers named by the Chicago court.

Receivers for the Central Union Telephone Company in Indiana were appointed in the Superior Court on petition of the same stockholders who had instituted similar action in Chicago. John A. Moriarty of Indianapolis and the receivers named in Chicago were appointed.

The Work Before the New Illinois Commission

Address Before the National Independent Telephone Association

BY HON. RICHARD YATES

NOT the least important of the many arduous tasks of the governor of Illinois was the initiation or installation of the new State Public Utilities Commission, created by the act of the last general assembly, absorbing the old Railroad and Warehouse Commission with all its rights, powers and duties, and giving to the newly created body still greater scope.

It is pleasant to recollect that this association of yours, with your characteristic fairness, has heretofore expressed favorable opinion as to the establishment of the commission, and it is still more pleasant to realize that the state has your promise of co-operation with the commission, to the end that conditions generally may be improved and the cost be reduced wherever possible.

The telephone covers a large field of usefulness, industrial as well as social, and the service can, in many instances, be improved. This is true, I think, almost everywhere. In fact, all can agree that improvement is possible in the conduct of any business, not even omitting the state; and the differences that arise commercially are largely economic; and to help adjust these differences is one of the most important functions of the new State Public Utilities Commission.

It is evident that, left to themselves, the carriers have, many times heretofore, been at a loss as to how the rates and service might be made just and reasonable, even between themselves. The rates determined by gas companies, water companies, light companies and electric power companies, telegraph and telephone companies, et cetera, involved many of the intricacies accompanying transportation problems. But there must be a reasonable basis which the evolution of public utilities is bound to discover and disclose. The people desire this basis, this foundation, and no fair-minded person can object to the state intervening to help to secure the solution of difficulties which may be encountered.

Already the efforts of this commission have been welcomed by the press, by the utilities and by the public generally, and these efforts have not been thwarted. Adjustment has been the rule, more than compulsion, already.

That which is required, principally at this time, is illumination on the subject of public utilities. We feel sure that all utilities desire to adjust differences and iron out inequalities and prevent discriminations; and, also, to improve service of all kinds and secure proper standards of service. We have detected no anxiety to the contrary; no disposition to evade either the law or reasonable regulations.

Again, publicity of accounts should work hardship to no one. A uniform system of accounts cannot be objected to, provided that utilities, when divided into classes, are subjected to such classification in a proper manner.

An honest public utility can have no better friend than a state inspector or examiner of accounts. I was once United States collector of internal revenue with 100 employes collecting $20,000,000 a year from federal taxpayers in fifty counties, and I learned to regard the inspector sent to me from Washington as in substance and effect the best friend that I had.

To sum up: There is a three-fold interest involved in the handling of the product of utilities. There is the company furnishing, the consumer using, and the state. The introduction of this new factor in to the regulation of utility business is not to be feared. It destroys nothing. It preserves all that is good. It allows full co-operation.

In behalf of my colleagues, my fellow commissioners, it ought to be said that the commission aspires to be absolutely fair in all its endeavor; and to take up, as the governor has insisted, the various questions that come before it, in a purely business attitude and non-partisan manner, seeking to adjust all things that come before it on a sound and economic basis.

We appreciate the responsibility; and we seek and solicit, from all sides, both information and help—to the end that the governor and the people of this state may feel that the opportunities which they have placed in our hands have been handled, not unwisely, but in the interest of all the people, and of all honest business, thus starting Illinois in the race for first rank in this great field.

One thing more: As a member of the commission, I can assure you that it is the earnest desire of every commissioner to maintain from the start a well-earned fame and reputation for acting first and talking last. We want to be a commission of action and not prophecy—refraining from decision or public discussion until fully advised in the premises and fully ready to act. We have thus far hurried nothing and delayed nothing. We are feeling our way, profiting by the example of other states, and their experiences. We are not telling or trying to tell what we will do or won't do. If there is any one thing which the public may absolutely depend upon, it is that neither the commission nor individual commissioners will at any time be so foolish as to give out in advance any expression or indication at all of its policy or of its decisions. All such advance statements hitherto circulated have been false. All men should surely know that such a commission as this is a court as well as a board, and that if it cannot keep its own counsel the governor will surely get a commission which can do so.

I attach, as an exhibit, the following statement, hurriedly forwarded to me from Springfield by the Illinois Legislature Reference Bureau:

In the second district, state of New York (viz. the state, excluding New York City), the Public Service Commission has to deal with:

Steam railroad corporations	183
Street Railways	125
Express companies	7
Electric light companies	301
Telephone companies	126
Telegraph and cable companies	8
Gas companies	218
Miscellaneous public service corporations	15
Total companies	924

Against these figures, in Illinois, including Chicago, we have:

Steam railroad corporations	255
Electric street railways	306
Express companies	8

Electric light companies	647
Gas companies	152
Telephone and telegraph companies	1,462
Water works	84
Water transport companies	18
Water power companies	8
Miscellaneous utilities	83
Total companies	2,973

St Louis Jovian Chapter Meets

At the annual meeting of the St. Louis League of Electrical Interests, Jovian Chapter, on January 20, there were one hundred and fifty present. The following officers were elected: H. J. Pettengill, president Southwestern Bell System, president; Frank D. Beardslee, sales manager Union Electric Light and Power Company, first vice-president; F. B. Adam, vice-president and general manager Frank Adam Electric Company, second vice-president; Fred B. Johnson, sales manager Wagner Electric Manufacturing Company, secretary and treasurer.

Reigning Jupiter W. N. Matthews, in the absence of President A. C. Einstein, called the meeting to order, immediately upon the completion of the dinner. He called upon W. A. Layman, chairman of the nominating committee, for his report. As soon as Mr. Layman mentioned the choice of the nominating committee, a motion was carried to instruct the secretary to cast the ballot of the club, and they were declared unanimously elected.

Jupiter Matthews then tendered the gavel to Mr. Pettengill. Just as he did so, J. D. Von Mauer of the Laclede Gas Light Company clamored for recognition, and in a humorous speech decorated Herman Spoehrer, Mr. Einstein's representative, with the insignia of The Ancient and Honorable Order of the Sacred Tin Can. This consisted of a tomato can, which had a brass plate on its side, inscribed as follows:

Presented to A. C. Einstein, retiring president of the St. Louis League of Electrical Interests, Jovian Chapter, January 20, 1914, by the Ancient and Honorable Order of the Sacred Tin Can.

Attached to the can was a nickel-plated pump chain by means of which it was suspended around the neck.

Mr. Pettengill is a finished toastmaster and gracefully introduced and called on the following gentlemen: (In doing so, he warned them that if they spoke more than five minutes, they did so at their own peril. One of the gentlemen exceeded his time limit, and a twelve-inch, 110-volt gong drowned him out. This was underneath one of the tables and nobody knew who had control of the push button).

W. A. Layman, president Wagner Electric Manufacturing Company, made a number of valuable suggestions for the future usefulness of the league. He called attention to the fact that the St. Louis League of Electrical Interests, Jovian Chapter, now has a membership of over nine hundred, and is therefore the largest electrical league in the United States or Canada. The following also spoke:

W. J. Hiss, general manager, Southwestern Telegraph & Telephone Company. S. A. Hobson, Third Jupiter, Jovian Order. F. D. Beardslee, sales manager, Union Electric Light & Power Company. Edgar S. Bloom, second vice-president, Southwestern Bell System. T. M. Meston, vice-president, Emerson Electric Company, Ell C. Bennett, Twelfth Mercury, Jovian Order. F. N. Boyer, district manager, General Electric Company. Henry H. Humphrey, consulting electrical engineer.

The music was furnished by the orchestra of the Union Electric Light and Power Company, which is entirely composed of employes of that company.

A very interesting moving picture film was furnished by the Bell Telephone Company, the title of which was "The Spinners of Speech."

The chief stunt of the evening consisted of a Victrola, which had in the lower compartment for records, a loud speaking receiver, which was attached to a loud speaking transmitter in another room. W. O. Pennell, equipment engineer, Southwestern Telephone & Telegraph Company, and H. Louis Hoffman of the engineering department, designed this stunt. Mr. Pennell first put on the famous record of Farrar and Scotti, known as the "Night of Love." When this was finished, he announced that he would put on a record which was the invention of Ivan Ivanhoff, an obscure Pole, and which his audience would note was of unusual length and clearness. A song, which, mentioned nearly everybody present, was then sung into the loud speaking transmitter by the chairman of the entertainment committee.

Close Telephone Exchange Sunday

Residents in the rural sections of Washington county, Pennsylvania, are up in arms over the action of the National Telephone Company in closing down its exchanges for 24 hours.

The action of the company followed the fining of officials for violation of the new state law in employing telephone girls for more than 54 hours in one week. The officials assert they cannot afford to put on extra girls and so closed down the office, thus cutting off many parts of the county from the outside world and putting numerous county lines, which connect with the National, out of business.

In Washington itself the National is an automatic system, and as a result it was possible for local subscribers to get local service. But outside of the immediate limits of Washington all lines were tied up. Great inconvenience resulted.

As a result of the telephone tie-up it is probable that prosecutions will be started to compel the National Telephone Company to open its offices on Sunday.

J. G. Splane, of Pittsburgh, receiver of the company, says it is impossible to employ more girls at present, as the business does not justify it.

Rescinds Order for Night Closing

It is given out by the Nebraska Railway Commission that the recent order allowing the Lincoln Telephone & Telegraph company to close its exchange at Tecumseh from 1 to 3 a. m. has been revoked, on account of protests filed by the patrons. However, this will probably make no material difference in the operation of the exchange.

Secretary A. B. Allen of the commission says that the practice heretofore has been for the central operator to go to sleep about 1 o'clock, and if any calls come in to get up and answer them. The same practice will probably be followed hereafter. Officials of the telephone company were notified by Labor Commissioner Pool a short time ago that a woman operator could not be kept on duty more than eight hours at night, and the proposal to close the exchange for two hours was to save the expense of hiring additional operators.

The Acts of Your Neighbor

Some Points of Practical Law Which Should Be Known to Everybody

BY WALTER K. TOWERS

QUARRELS not infrequently arise between neighbors. Difficulties may arise and disputes occur even though neither crosses the line that divides his possessions, but confines himself strictly to his own property. One may do many things on his own property which will affect and annoy his neighbors. He may burn a cheap grade of soft coal which scatters soot and smoke over his neighbor's premises. He may dig a ditch close to the line which causes his neighbor's land to cave in with the result that his barn topples over. Or he may build an unsightly shed, close to the street, which seriously affects the appearance of his neighbor's premises and shuts off the light and air from his house. Still again he may blast some stumps, and pieces of rock may fly across the line of his property and kill his neighbor's cow. So it is that one often has need to know of his rights against a neighbor who has done things on his own property to the injury of the man who owns the property next to his. These are questions of the rights of adjoining landowners.

We have heard that an Englishman's house is his castle and it is a general rule of law that one has the widest control over his own property and may do with it about as he pleases. But there are certain rights of his neighbor in particular, as well as of the public as a whole, which must be recognized and respected. In so far as possible one must use his own property in such a manner as not to do injury to the property of his neighbor adjoining. One may enjoy his own property but he must enjoy it in such a manner as not to injure the property of another. But this rule cannot be absolutely enforced for it is limited by the larger principle before stated that one is supreme in his own dominions. So if one makes use of his property which is legitimate and yet which causes injury to his neighbor that neighbor must suffer without legal redress. It all depends on whether the use is justified.

When one wishes to blast with powerful explosives on his own premises in the improvement thereof is bound to proceed with all possible care and caution and if he does not do so he is responsible for any injury which may result to the property adjoining. If he hires another to do the work under his direction he is still liable for any injury resulting from any lack of caution or proper execution of the work. If he hires a contractor to do the work, so that it is not under his own control and direction, he is not liable for the contractor's faults, unless he knew that the contractor was to proceed in an improper manner. Some states under certain circumstances have held that one is absolutely liable for the results of blasting on his premises whether he has been in any way at fault or not. This view has been taken in cities where it is frequently insisted that the use of high explosives on a city lot is an unreasonable, unusual and unnatural use of property and for such use he must answer to his injured neighbor, whether there has been any lack of care or not. Blasting in unsettled communities, away from buildings, with the usual and proper precautions is not usually held to be an unreasonable use of property for which the person blasting is answerable, unless he has proceeded with lack of caution. A landowner may secure an injunction to prevent a neighbor from blasting without the use of usual and prudent safeguards against possible injury.

Whether one keeps his own premises in repair or not is generally an affair of his own, yet if he fails to keep his premises in proper repair and, because of this injury occurs to the property of his neighbor,—as through fall of his barn—he must answer for it. This rule applies to those owning adjoining tracts of land, but not to those who own separate parts of the same building. Thus one may own the first floor of a building and another the second. Neither is bound, in the absence of special agreement, to keep his portion in repair so that injury may not result to the other portion. If the owner of the upper portion fails to keep the roof in repair and rain injures the property of the owner of the lower half there is no liability.

Every landowner owes to his neighbor what is known in law as lateral support. That is, in digging a ditch, or making an excavation close to the line, the person doing the digging must see to it that support is not withdrawn from his neighbor's land so that it will cave in or be weakened in any way. Neither landowner may withdraw the support from the other's land. This does not mean that one may not excavate, but it means that he must by means of a wall, or by props, support the other's land so that it will not tumble down. If he fails to do this he is responsible for all resulting injury.

The support that is owed to the land of the neighbor is support to the land in its *natural condition*, that is unincumbered by the weight of buildings. Thus if one excavates on his own property, and the land of his neighbor on which a house is situated caves in, he is responsible for the resulting injury if the excavation would have caused the land to cave in had no house rested upon it. But if the land would not have caved in but for the weight of the building upon it the person digging has not violated the duty of lateral support to the land in its natural condition and is not responsible.

This right to excavate does not relieve the landowner from the duty to take reasonable precautions and carry on the work with due care. He must exercise ordinary skill and care to avoid injury to adjoining land upon which there are buildings. In many states statutes have been enacted which govern the making of excavations, limit the depth, specify the precautions which must be taken, etc. Usually these statutes require that notice be given to the owner of the adjoining property of the intended excavation so that buildings may be protected. Whether there is a statute or not this is a wise precaution.

In the absence of some special restriction one may build almost any sort of a structure that he desires on his property and in any location so long as he keeps it within the boundaries of his property. He owes no duty to his neighbor not to shut off the light or air from a structure on the adjoining premises. This is the general rule. There may be some restriction applying to the particular premises, imposed by the transfer of some previous owner, which regulates the kind of a structure which may be built, where it may be built and for what purposes it may be used. There may be a municipal ordinance regulating the sort of building that may be built within

certain limits, and if so it must be complied with. Before you plan to erect a structure or buy land with view to erecting a structure be sure that you know what the restrictions are. "Spite houses" are, generally speaking, within the law. One may build any sort of structure he will, in the absence of restrictions, and the law will not inquire into his motives.

The air must not be unreasonably polluted by smoke, gases or odors. Whether any use is unreasonable depends upon the particular circumstances of that general location. The pollution must be so serious as to interfere with the ordinary enjoyment of life or the comfort of existence before the law will interfere. In the absence of smoke ordinances one may, generally, burn any kind of coal he wishes to.

If one keeps dangerous and unusual things upon his premises, as stores of high explosives, he is responsible for any injury which may result to a neighbor, as this is regarded as an unreasonable use. The use one makes of his premises must be that of an ordinarily careful, prudent and normal person.

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New York Commission's Annual Report

The New York Public Service Commission, Second district, in its seventh annual report recommends several important amendments to the public service commissions law. Among these the commission urges that it be given authority, such as is now possessed by the Interstate Commerce Commission, to suspend for a period not exceeding four months the taking effect of advanced rates pending investigation as to the reasonableness of the proposed advance. The commission refers particularly to the need of such additional power with respect to the proper regulation of railroad and street railroad corporations, telegraph and telephone, express, gas, and electrical corporations.

The report points out that the New York Telephone Company has been acquiring the property but not the franchises of independent competing companies. The commission recommends the amendment of subdivision 2, section 99 of the public service commission law, in its application to telegraph and telephone corporations, so as to prohibit the acquisition by one company of the plant and property of another company without the written consent of the commission, as is now the case with respect to the acquisition of gas corporations and electrical corporations.

In this connection the commission urges that its jurisdiction be extended to include all telegraph and telephone companies, whether possessed of more or less than $10,000 worth of property.

Inspections have been made of 265 telephone exchanges, rendering service to approximately 448,675 subscribers' stations. Upward of 778 recommendations have been submitted in inspection reports, and with few exceptions they have been accepted by the companies. Service observations are made by inspectors without the knowledge of the operators, to determine the average speed and accuracy of the service.

Telegraph offices have been inspected at 95 places. The inspections cover the office equipment, apparatus and pole lines.

The matter of equitable toll rates of the New York Telephone Company between the Borough of Manhattan and the several boroughs in Kings and Queens counties was gone into very thoroughly and an order was entered to include the localities represented within the 5-cent zone from lower Manhattan, and otherwise to readjust the local areas in Brooklyn. The commission instituted a further inquiry into all the interborough toll rates within Greater New York, as a result of which the telephone company proffered a general revision of its interborough toll schedule. There are now under way investigations of the charges for telephone service in New York City, including private branch exchange rates and rates for extension stations connected therewith, and the pay station rate of 10 cents where the corresponding subscribers' rate is 5 cents.

There have been made to the commission 656 informal complaints as to telephone service in various sections of the state.

The commission's division of statistics and accounts has done much to foster a widespread appreciation of the importance of rigidly accurate standards for published financial statements of corporations. The improvement each year in the annual reports filed with the commission by corporations under its jurisdiction is the best evidence of the commission's success in this branch of its work.

The fundamental principle of the commission's accounting system is that all property and rights which constitute the permanent investment of a business shall appear upon its books at cost. With the establishment of regulative commissions the need has been made evident of accurate records, which will show beyond any reasonable doubt what has been actually expended in perfecting the organization of a public utility corporation and constructing its property.

Northeastern Ohio Operators Meet

The annual business meeting of the Northeastern Ohio Independent Telephone Association, which comprises thirty-one rural telephone companies of Ashtabula, Trumbull, Geauga and Lake counties, was held February 6 at Ashtabula, with a good representation of members present.

The chief topic of discussion at the meeting was the requirement of the State Public Utilities Commission that stockholders must pay as much for their telephones as ordinary subscribers. There was no action taken, but the convention decided to send the president of the association, C. E. Noble of Windsor, to Columbus to talk with the commission regarding the ruling and learn just exactly what the rural companies will have to do along this line.

Under the present arrangements each stockholder pays $3 a year for the use of his telephone, while the ordinary renter pays on the average of $10 a year. Three or four of the companies in the association have received notice from the utilities commission stating that the rates must be made uniform, but all of the companies have not received such notice. This was partially responsible for sending the president to Columbus to secure more facts.

Another proposition considered was the securing of different telephone service from the districts south of Plymouth and Austinburg into Ashtabula. At the present time the Ashtabula Company, which is not a member of the association, does not take calls from points south unless they come through Jefferson. This, the association people claim, not only increases toll, but does not give the best service. An attempt is to be made to secure a change in the manner of handling these calls.

The association was reported to be in good condi-

tion. The union was formed in 1905 for mutual benefit and is maintained by each company paying into the treasury 2 cents yearly on each telephone. There are about 4,000 telephones in the association the present time.

Officers were elected as follows: C. E. Noble, Windsor, president; George Platt, Richmond, vice-president; B. F. Peck, Williamsfield, secretary, and William Stults, New Lyme, treasurer. Stults and Noble were re-elected.

The annual meeting of the association is always held in Ashtabula.

Discussion at Minnesota Convention

The announcement by the American Telephone and Telegraph Company that it will sell its Western Union stock and open its toll lines to independent companies was characterized as "an adroit move to stave off disaster," by Lucius F. Clark of Bellingham, president of the Minnesota Independent Telephone Association, in his opening address to the association at the annual meeting at the Hotel Ryan, St. Paul, January 27. He also censured Governor A. O. Eberhart for his veto of the Minnette bill intended to accomplish the same purpose.

About seventy-five delegates, representing telephone companies scattered throughout the state, attended the meeting. Telephone supply men were also in evidence and were hosts at a banquet at the Hotel Ryan to the telephone men.

Mr. Clark said he confessed a lack of faith in the good intentions of the other company. "When discrimination has ceased and the Western Union is divorced without alimony, when physical connections are allowed to all independents without discrimination, then only will I be convinced of the Bell Company's conversion," he said.

Minnesota, he said, needs a law to prevent discrimination in rates and force physical connections between toll lines. To show that discrimination exists, he said he knows of one town 160 miles from St. Paul which has a day rate of 40 cents and a night rate of 20 cents, while another town ten miles nearer has a day rate of $1.10 and no night rate. In Granite Falls, he said, the Northwestern Telephone Company, a Bell subsidiary, is trying to kill competition by flooding the town with solicitors signing up five-year contracts at 5 cents a call and $1 a month.

The law for state control of telephones, advocated by the independents, has been voted on three times in each body of the Minnesota legislature, Mr. Clark said, and the total vote has stood 398 in favor and 103 against. Yet there is no law, as it has been defeated either by the two-thirds rule or by the governor's veto.

Traffic Men Meet in Oklahoma

A conference of traffic employes of the Pioneer Telephone and Telegraph Company was held February 2 at the Pioneer building in Oklahoma City, Okla. The sessions continued for four days, Percy Redmund, general traffic superintendent, presiding over the meeting.

The purpose of the conference was to further the advancement of the local and long distance telephone service, both interstate and intrastate, by the study and adoption of the latest and best methods for handling the traffic to the end that the public may be provided with the best service obtainable.

The following traffic men were in attendance: J. P. Wadham, division traffic superintendent, American Telephone and Telegraph Company, Kansas City, Mo.; S. L. Tabor, supervisor of traffic, Southwestern Telegraph and Telephone Company, Dallas, Texas; L. M. Loring, division traffic superintendent, Southwestern Telegraph and Telephone Company, Little Rock, Ark., and the following Pioneer Telephone and Telegraph Company representatives: Percy Redmund, general traffic superintendent, Oklahoma City; J. R. Thompson, division traffic superintendent, Oklahoma City; F. C. Hirdler, supervisor of traffic, Oklahoma City; M. M. Glauber, traffic engineer, Oklahoma City; O. D. Sackman, district traffic chief, Shawnee; G. A. Jenkins, district traffic chief, Lawton; A. R. Harris, district traffic chief, Enid; T. L. Golay, district traffic chief, Tulsa; H. L. Baldwin, district traffic chief, Muskogee; L. E. Leopold, district traffic chief, Oklahoma City.

These general conferences of the traffic department of this company constitute an annual event. The conference closed with a smoker.

Nebraska Convention March 11

The Nebraska Independent Telephone Association will hold its annual convention Wednesday, Thursday and Friday, March 11, 12 and 13, at Columbus, Neb. The first session will be called to order at 7:30 p. m. Wednesday, March 11.

A large number of exhibitors have expressed their intention of being present and will bring with them interesting exhibits of modern telephone equipment and appliances.

C. J. Garlow is chairman of the local arrangements and hotel committee. All requests for reservations should be forwarded to him at Columbus, Neb.

The train service in and out of Columbus is very satisfactory, so a large attendance of Nebraskans is expected at this convention. Many important matters will be discussed. Every independently owned telephone company in the state should send representatives.

Western Red Cedar Association

At the regular annual meeting of the Western Red Cedar Association held in Spokane last January the election of officers and directors was carried out as provided by the new constitution and M. P. Flanney, vice-president of the association during 1913, was elected president. W. M. Leavitt, western manager of the National Pole Company, was elected vice-president. R. G. Jones of the Lost Creek Cedar Company of Ione, Wash., R. C. Culver of the Sandpoint Lumber and Pole Company, and C. P. Lindsley of the Lindsley Brothers Company were nominated for directors of the association. Mr. Lindsley withdrew in favor of E. T. Chapin and Messrs. Jones, Culver and Chapin were duly elected as directors of the association for the year 1914.

President Bars Telephone Oratory

President Wilson will make no more long distance addresses. This information was conveyed in a letter from the White House to officials of the New York Efficiency Exposition and Conference which is to be held in New York City in a short time.

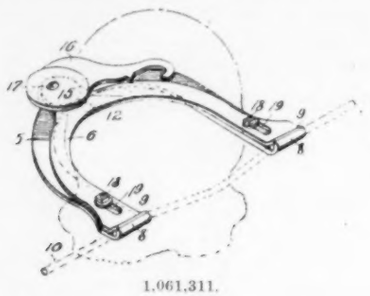
It was learned that since last spring, when the President consented to address diners in New York by long distance telephone, he has been flooded with requests of this kind.

Recent Telephone Patents

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

U. S. Patent No. 1,061,238. For an Improved Telephone Coin Collection Box. Issued to Arthur U. Gerber, Chicago, Ill. The inconvenience of "not having a nickel in the house" when it is a "nickel telephone" and will not work without the coin, is obviated by Mr. Gerber's improved coin box. A button at the side of the box may be pushed and the call may be made

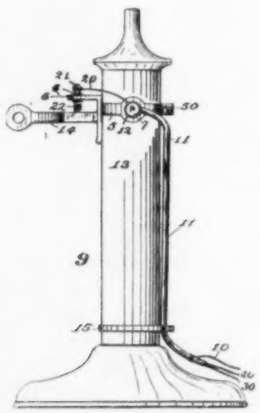


1,061,311.

without depositing the coin. A counter in the box keeps a record of the number of calls not paid for, and when a set limit is reached the counter locks the button so that the unpaid call feature cannot be used to excess.

1,061,285 Party-Line Telephone System. Ruben C. M. Hastings, Columbus, O., assignor to The International Telephone Company, Columbus, O. The feature attained is the locking-out of a telephone upon a party line when the line is in use by other telephones. This feature is attained by shunting all of the telephones not engaged in a conversation and selecting and ringing the telephones to be connected for speaking. A single selecting device combines the two functions of selecting a station when desired for conservation and of shunting the telephone when not desired.

1,061,286. Selecting Apparatus for Party Lines. Reuben C. M. Hastings, Columbus, O., assignor to The International Telephone Company, Columbus, O. The device comprises



1,061,589.

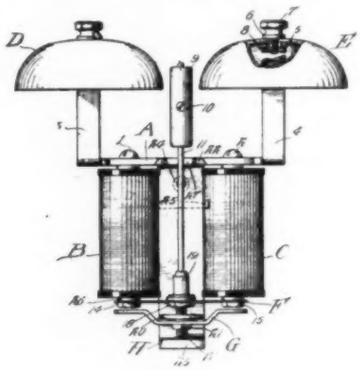
a selecting key having a supporting frame and a slidable carriage in the frame. The carriage is adjusted as desired, depending upon the signals desired to be sent. The carriage then is pushed by the knob of the key and the signals are sent as the carriage is returning. Under spring power and under speed control of a governor.

1,061,287. Party Line Telephone System. Reuben C. M. Hastings, Columbus, O., assignor to The International Telephone Company, Columbus, O. In this party line system the feature of locking out the undesired stations upon a telephone line is accomplished by locking the hook lever so that the hook switch may not be closed. A rotating shaft is used in connection with the hook locking mechanism.

1,061,311. Line Wire Fastener. Arthur M. Morgan, Bridgeport, Ohio. The line wire fastener, or substitute for the well known tie-wire, is shown in the illustration. The movement of the small lever moves the upper plate forward upon the lower one and thus locks the line wire at both ends of the horseshoe.

1,061,515. Telephone Trunking System. Charles A. Bals, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, Chicago, Ill. The improved trunk circuits are particularly adapted to use from a manual telephone switchboard to an automatic switchboard, or for connections between manual and automatic telephone lines by means of pairs of cords and plugs.

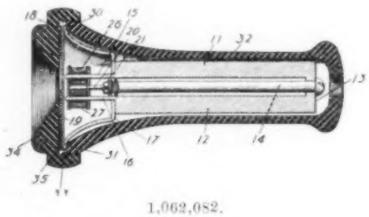
1,061,516. Operator's Telephone Circuit. Charles A.



1,061,733.

Bals, Chicago, Ill., assignor to Corwin Telephone Manufacturing Company, Chicago, Ill. The object sought is to prevent the operator at a telephone switchboard from listening upon more than one pair of plugs at the same time. To effect this, a relay is provided for opening the operator's circuit, and this relay has its winding in series with a resistance coil whenever a listening key is turned. One such coil with one listening key turned does not give sufficient current to the breaking relay, but two such coils in multiple when two listening keys are turned at the same time give sufficient current to actuate the relay and break the operator's telephone circuit.

1,061,519. Controlling Apparatus for Automatic Selectors. W. G. Blauvelt, New York, N. Y., and Edward C. Molina, East Orange, N. J., assignors to American Telephone and Telegraph Company, New York, N. Y. The application of the invention is found in semi-automatic telephony, and it constitutes a button-bank call sender for an automatic tele-



1,062,082.

phone switchboard. A series of keys are associated with locking relays in such manner that a signal is sent to an automatic telephone selecting switch determined in character and operating to adjust the switch in accordance with the identity of the key which has been depressed.

1,061,589. Busy Signal for Extension Telephone Sets. Adam M. Beeler, Seattle, Washington. The object to be at-

tained by this improved attachment is a novel one. When two telephones are connected upon one telephone line, as two telephones in two rooms of the same offices, a small lamp is placed upon each of the telephones, and both of these lamps glow when either telephone is in use, thus giving at the idle telephone a visible signal that the line is in use.

1,061,650. Automatic Telephone System. Franz Gunnar Agrell, Stockholm, Sweden. (Application filed October 10, 1906.) The invention deals in a very broad way with the operation of automatic exchanges with automatic sub-exchanges or automatic line-distributing centers. It is provided that trunk circuits extending from a main controlling central exchange shall be seized automatically, held automatically, and released automatically by lines radiating from the branch center. The claims, twelve in number, are broad, and the filing date is early.

1,061,651. Telephone System for Distribution of Traffic Among Operators. Franz Gunnar Agrell, Stockholm, Sweden. (Application filed October 10, 1906.) A calling line has the ability to engage an operator's circuit if the operator be idle at the moment, but when the operator's circuit is so engaged it is rendered busy by test and no other subscriber can engage it until the first call has been disposed of. As each subscriber has several operators available, it follows that automatically an idle operator is selected.

1,061,733. Harmonic Ringer. Charles J. Erickson, Chicago, Ill., assignor to First Trust and Savings Bank, trustee. (Application filed December 18, 1905.) The novelty is found in the manner of applying the spring to the armature. The spring is shown at *F* in the illustration and is a spring yoke of sheet metal connecting the ends of the electromagnet cores. The striker and the armature *G* are rigidly connected to each other but are otherwise entirely free except at the point where they are mounted upon the supporting spring *F*.

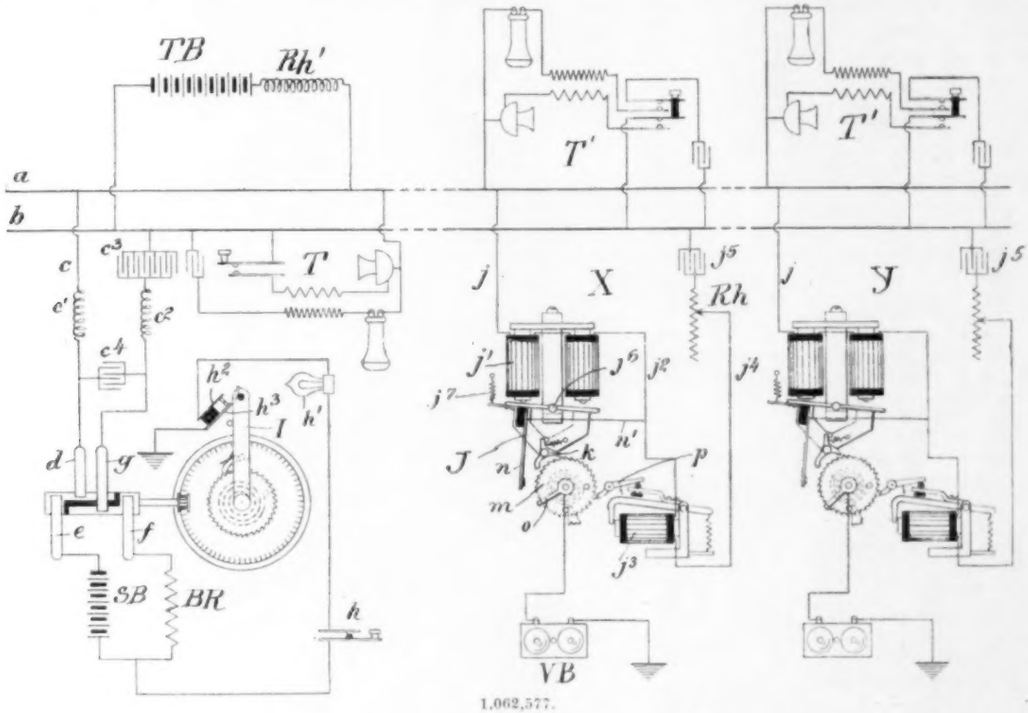
1,061,766. Receiver Diaphragm. Alexander Marr, Manchester, England. The novelty is in the manner of holding or supporting the vibratory metal part of the telephone receiver. A heavy ring of metal has a groove on its inner surface and this heavy ring holds the thin sheet metal diaphragm by making engagement only with the edges of the sheet. The heavy ring then is champed by the receiver cap and case.

1,061,813. Improved Microphone Resistance for Telephone Transmitters. Sidney George Brown, London, England. (Application filed February 4, 1910.) The resistance cell does not contain carbon, but fragments of osmium and iridium alloy.

1,061,849. Transmitter. Francis Kayser, Philadelphia, Penna. The mechanical construction of this transmitter places the sound diaphragm upon a short arm of a lever while the carbon resistance cell (or equivalent) is upon the other end of the lever. The movement of the diaphragm thus is magnified. The claims refer to specific mechanical features.

1,061,852. Cordless Switchboard System for Telephone Lines. Abraham Lawrence, Elizabethtown, Ill. The principle of switching is to have the connecting circuits brought to the line jacks so that by the insertion of a cordless plug into a line jack the line is connected to a link circuit to which link circuit another line may be connected later by inserting another cordless plug into the jack of the second line. The two lines thus would be connected to each other by being both connected to a linking circuit. A single line jack is associated with several link circuits and plugs having a difference in one dimension determine the link circuit used.

1,061,894. Protective Apparatus, Ross Lee Baker, Joplin, Mo. A fuse block has a fuse plug which carries a fuse wire stretched across the inner end, and a signaling plunger extending through the fuse plug and spring pressed against the fuse wire, that the plunger may be released to give a signal in case the fuse wire should be melted.



1,062,577.

1,061,898. Lockout Device for Automatic Telephone Party Lines. Wilson L. Campbell, Chicago, Ill., assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed February 26, 1907.) In a telephone of the automatic type having a dial for calling the desired telephone automatically, means is provided at the telephones of a party line such that when a receiver is lifted upon a line already in use the calling dial becomes locked and cannot be operated to disturb the conversation already in progress.

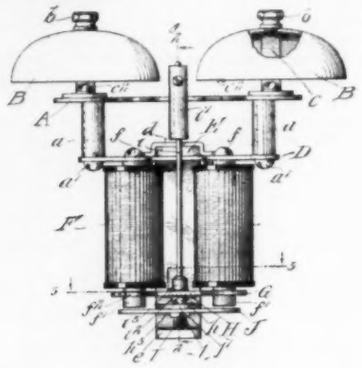
1,062,004. Party Line Lockout Telephone System. Ruben C. M. Hastings, Columbus, O., assignor to The International Telephone Company, Columbus, O. The selecting and lockout device is of the step-by-step type. A rotatable shaft in the telephone is operated under control of the central office, and carries cam teeth to accomplish the changes required for lockout and selection at the telephone.

1,062,082. Telephone Receiver. Edward B. Craft, Hackensack, N. J., and John N. Reynolds, Greenwich, Conn., assignors to Western Electric Company, New York, N. Y. The permanent magnet of the receiver has a soft iron extension, the magnet and the extension being welded together, and the extension being fitted with coils and forming the operating magnet cores of the instrument.

1,062,161. Duplex Telephony. Isidor Kitsee, Philadelphia, Penna. (Application filed March 16, 1907.) The improved telephone circuit is "duplex" in the sense that both

transmitters of the line may speak at the same time without confusion in the two receivers. Each transmitter generates two voice currents, by the use of two induction coils, one of these currents neutralizing the other in the home receiver but not in the distance receiver. When such a line is used for a single conversation, it has the feature of being without side tone.

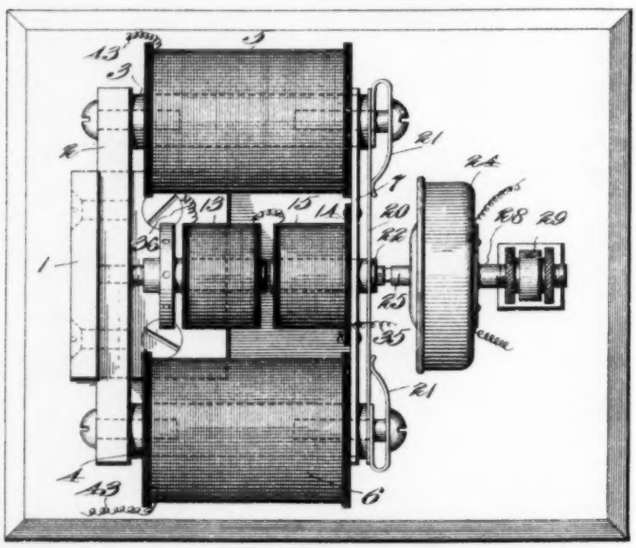
1,062,387. Measured Service System for Automatic Telephones. John Erickson, Chicago, Ill., assignor to Automatic Electric Company, Chicago, Ill. The central office circuits are such that upon a telephone line from a coin-prepayment



1,062,586.

telephone station the calling telephone is rendered incapable of speaking when the called station has answered the call. The calling patron then by depositing "a plurality of coins" may make his transmitter operative again. The method of requiring the deposit of several coins is to step a ratchet by each coin deposited, and to render the transmitter operative only after several steps of the ratchet have been made.

1,062,559. Cushion for Telephone Diaphragms. William P. Stunz, Lansdowne, Md., assignor to George R. Webb, Baltimore, Md. The cushion resembles a ring of expanded metal and one such ring is placed on each side of the dia-



1,062,754.

phragm, between the diaphragm and the case of the transmitter.

1,062,577. Telephone Party-Line System. E. E. Kleinschmidt, Brooklyn, N. Y., assignor to General Railway Equipment Company, a corporation of Maine. This system retains the advantage of central energy for speaking upon a line having stepping selectors, the advantage being attained by placing condensers in all circuits but the speech transmitter circuits, the stepping selecting devices being such that they may operate their armatures by the impulses of current through the condensers.

1,062,586. Harmonic Ringer. C. J. Erickson, Chicago, Ill., assignor to First Trust and Savings Bank, trustee, Chicago, Ill. (Application filed December 14, 1905.) The claims depend upon the feature of having the length of the armature spring extending at right angles to the plane in which the armature and striker vibrate, so that the spring strain is torsional.

1,062,754. Speech Relay. Charles Adams-Randall, Boston, Mass. The two large coils are in a local battery circuit and form a field for the receiving coils. The two small coils are in the receiving circuit, the small coil upon the heavy magnetic yoke having a fixed and solid core, and the small coil upon the light non-magnetic yoke having a light tubular movable core attached to one electrode of the carbon resistance cell.

1,063,237. Receiver. Victor Anderson, New York, N. Y., assigner to Western Electric Company, New York, N. Y. The permanent magnet, the soft iron cores, and the usual non-magnetic cup are assembled rigidly in this manner. The soft iron cores or pole pieces are cut with shoulders behind the spools, and with rearward extensions beyond the shoulders. The non-magnetic cup is perforated to permit the extensions to pass through but not the shoulders, the extensions then being welded to the permanent magnet, with the cup clamped between the shoulders of the cores and the ends of the permanent magnet.

1,063,249. Protector. Per E. Erikson, New York, N. Y., assignor to Western Electric Company, Chicago, Ill. (Application filed March 16, 1909.) In an air-gap lightning arrestor, the discharge plates (customarily of carbon) are of metal, one of them of copper and the other of an alloy of copper.

1,063,270. Receiver. John J. Lyng, Yonkers, N. Y., assignor to Western Electric Company, New York, N. Y. A receiver in which the pole pieces are welded to the permanent magnets and the cup clamped between. The pole pieces are forked at their rear ends, the two fork-ends of each passing through separate holes in the cup to clamp it by the metal within the fork.

1,063,361. Telephone System. Oscar M. Leich, Genoa, Ill., assignor to Cracroft, Leich Electric Company, Genoa, Ill. In a small branch switchboard a storage battery is kept charged by current from the main central battery over the conductors of a talking trunk, a key being provided to remove the trunk conductors from the branch switchboard battery when the trunk is to be used for talking purposes.

Sues to Regain 50 Cent Penalty

Odell Chapman, a wealthy attorney of Owosso, Mich., has brought suit against the Union Telephone Company for the smallest amount involved in any lawsuit in the history of the local municipal court. He seeks the refund of 50 cents paid the company as a penalty for his failure to pay his telephone rental before the 15th of the month.

While the money involved is small, the principle is of importance to telephone subscribers, as it will decide whether or not the company has a legal right to exact a penalty of 50 cents for failure to pay telephone rent by the 15th of the month. The city now has injunction proceedings restraining the company from exacting the penalty, pending in the Circuit Court.

Mutuals Must Pay Income Tax

All mutual telephone companies must file returns under the Federal income tax law, according to a ruling received from the department at Washington.

The department holds that every corporation, joint stock company and every insurance company, no matter how created or organized, is subject to the income tax, and will be required to make returns of annual net income, except such as are specifically enumerated in the act as exempt from its provisions. In the list of those so enumerated as exempt do not appear mutual telephone companies or similar organizations. The department further holds that it makes no difference whether or not these mutual companies are organized for profit.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

The "Aero" Cable Car

The "Aero" cable car has been designed with a view to minimum weight and extra strength, weighing but 20 lb. complete, and being constructed entirely of cold rolled steel and crucible steel castings, except the seat and pick-up roller which are of oak.

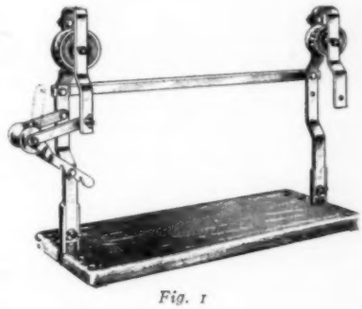


Fig. 1

All metal parts are sherardized (rustproof), which assures free working of all parts at all times.

The car is arranged that it can be taken down in four parts, as shown in Fig. 2. The parts interlock in such a way that it is not necessary to take any of the bolts or nuts off when assembling or disassembling, all bolts being upset to prevent them from becoming detached and lost.

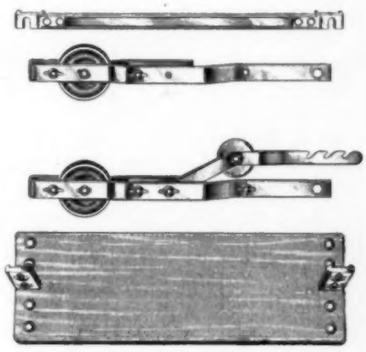


Fig. 2

The wheels of the car (which ride on the messenger wire), are corrugated in such a way that they pass freely over any cable hook or hanger, which is not possible with smooth faced wheels.

There is an adjustment on the car that permits the height to be increased or decreased for a long or short bodied man respectively.

The brace bar which runs across the back of the car can be adjusted to upper or lower position while the workman is using it on a messenger wire. Fig. 1 shows this bar in its lower position and Fig. 3 shows it in the upper position.

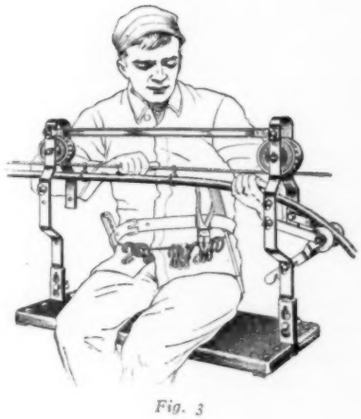


Fig. 3

The attachment shown on the left of the car in Fig. 1 is known as the pick-up roller and can be adjusted to different positions (according to the length of hooks or hangers used), so that the cable will come to the proper distance from messenger wire permitting cable hooks to be readily attached (see Fig. 3). Without the pick-up attachment the workman is compelled to hold the cable in position for attaching hooks and cannot attach half the number of hooks in a specified time that he can with the pick-up attachment. This has been proven by actual test.

The minimum weight of this car and the small space occupied (when knocked down) can be readily appreciated by telephone men, and permits, for instance, of one man placing car and tools on a motorcycle and going miles into the country to repair a cable, which otherwise would necessitate two men and a wagon or the shipment of car and tools, and then hiring a team to haul car and tools to the section where the trouble is located.

A New Form of Voltmeter

In the testing of insulated wires and cables designed for a great variety of purposes, a voltmeter as we have known it heretofore often fails to measure adequately the stresses to which the dielectric is subjected. Based on the integration of the sine wave—on the square root of the mean square of instantaneous values—voltmeter readings give little or no indication of unusual peaks in the voltage wave or of surges in the circuit.

The need of an instrument which would give such readings arose in connection with the high voltage testing of wires and cables, it being well known that in such tests the peak of the wave is what counts in breaking down the insulation. So long as a sine wave is maintained, the ordinary voltmeter indicates the peak voltage (a definite percentage above the voltmeter reading). But in cable testing there is a considerable charging current, due to the electrostatic capacity of the cable. As this current is likely to distort the wave form, the ordinary voltmeter may give no definite information as to peak voltage.

After trying and discarding both a spark gap, which proved to be too easily affected by outside conditions, and an oscillograph, which is too delicate an instrument for factory use, the engineers of the Simplex Wire & Cable Company, Boston, proceeded to develop for their own use apparatus which would give the required results. Based upon the principle of the oscillograph, but with its movement confined to a straight line, the new instrument, illustrated herewith, indicates the peak of the voltage wave at the limit of oscillation along that line. It does not show the character of the wave or form of its peak, but it does give very clearly the reading for that peak, whatever the shape of the wave may be.

This peak voltage meter, in its original crude form, was used successfully in the Simplex factory for some time, and thus thoroughly tested out. It has just been completed in its present form, after an experimental period extending over two years.

The voltmeter, which is of switchboard type, measures about 10 by 12 inches on the front and 14 inches deep. It consists essentially of a heavy electromagnet, between the poles of which is located the vibrator. By a suitable arrangement of lamp, mirror and lenses, a beam of light is thrown on a ground glass scale in front, graduated in volts. This instrument is connected, through a potential transformer, directly on the

high voltage circuit, the circuit being so small that the apparatus can be left in the circuit all the time. It can be quickly calibrated at any time by applying direct current of known voltage.

This interesting example of the development of an invention to meet a particular factory need might prove of considerable value in other lines as well as that of the manufacture of insulated wires and cables. But its principal indication is the readiness of the American manufacturer to undertake both the deep study and the careful experimental work needed to provide him with the tools with which his regular work can be carried on to best advantage.

Western Electric Developments in 1913

During 1913 the Western Electric Company has maintained the high standard it has established in the past, by contributing a number of new and important developments in electrical apparatus. The following outlines those developments in telephone and power apparatus which are most worthy of note:

Mine Telephones.—Probably the most important addition to the work which is being carried on in mining districts to bring about safety for the workers in the mines has been the perfection of a mine rescue telephone equipment. Rescue crews, although equipped with oxygen helmets and various safety appliances, have heretofore been considerably hampered in their work by the lack of means of communication with the outside of the mine; in fact, rescue gangs have been lost, as in a recent case at Dawson, New Mexico, for that very reason.

The mine rescue telephone equipment consists of a transmitter, which is arranged to fit the throat of the helmet man, thus permitting of the transmission of the sound waves through the walls of the throat, as the mouth is needed for the breathing in of the oxygen. A head receiver is also furnished, the combination of receiver and transmitter being held in place by a light but serviceable leather harness. The helmet man also carries one or more coils of wire, which connect to the telephone equipment used by the directing party at the mouth of the mine. This wire pays out as the rescue gang advances.

Railway Train Dispatching.—A new test board for way station service, known as the No. 2 type, has been developed to meet the need for a compact and flexible testing and patching equipment. Two sizes are available, the No. 2A, which is arranged for two metallic circuits, and the No. 2B, which is arranged for four metallic circuits. The test boards are so designed that all line terminals are made accessible for inspection by merely unhinging the outside cover, and all jack and key terminals by unhinging the apparatus board. The use of these new test boards provides a simple means for minimizing service interruptions.

A series of cordless jack boxes has also been developed for block telephone and telegraph service. These are described elsewhere.

Intercommunicating.—The hand set Inter-phone completes the line of intercommunicating telephones. This type of instrument has transmitter, receiver, and ringing button, all mounted on one handle. When not in use, the hand set can be placed in any position without causing waste of current, as the current is shut off automatically when the pressure of the hand is released. There are two general styles, the flush and the non-flush. The former makes use of a wall box with a face-plate, the same as the combination used for electric light switches, so that nothing projects beyond the wall but the hand set itself. For old buildings, where it is inconvenient to install the flush type wall box, there are non-flush boxes available.

The hand set Inter-phones are interchangeable with the wall and desk types for any one system. The system known as No. 16, requiring only two wires, is especially adapted to residences or hotels where annunciator systems are already in operation.

Switchboards.—Switchboard development has been confined to changes calculated to improve the old as well as the more recent types. The work has centered upon the standardization of switchboard frameworks and parts, and applies principally to the magneto non-multiple switchboards.

A standard local cable, which is the cable connecting the various coordinate parts of the switchboard, has been devised, as well as a standard key shelf which has a greater cord capacity than former types, so that more than the usual number of cord circuits can be furnished, as required by operating conditions. A standard method of mounting signals has also been instituted so that line and supervisory signals are now mounted on the same mounting bars. This results in a board having a more uniform appearance and increased flexibility, at the same time making it possible to furnish single or double supervisory circuits, transfer circuits, etc., without any changes having to be made in the framework.

The standardization of framework and other switchboard parts greatly simplifies the problem of quick deliversies. It is now possible to make switchboard shipments in two to six days after the receipt of order.

Repeating Coils.—Two new repeating coils have been developed for phantom circuit telephone work. These coils, known as No. 46A and No. 47A, have the same mechanical and electrical characteristics, and differ only in that the former has two coils on a single base, while the latter is mounted singly.

Their efficiency is such that transmission over a phantom can be obtained about 15 per cent farther than over the original physical circuits, while the loss in the repeating coil amounts to less than two-fifths of a mile of No. 19 gauge cable, per coil. The loss on the phantom circuits is only one-fifth of a mile.

Metal Telephones.—A new type of metal telephone for central battery use has been developed. This is a semi-flush telephone known as the No. 1357 type, and is intended for the same class of service which the non-flush No. 1333 telephone is designed to give. This includes single party, two-party selective, or four-party semi-selective signaling, and harmonic selective signaling. Provision is made for an instruction card on the face of the telephone.

A semi-flush desk set box, known as the No. 358, has been developed for use with desk stands, and contains the ringer, condenser and induction coil.

Both the Nos. 1357 and 358 types are finished in the famous Western Electric durable black.

Transmitters.—The use of insulated transmitters is being extended as rapidly as possible, to all types of telephones. Heretofore the metal frame of the transmitters has been used as one of the conductors, while the cord attached to a small binding post in the interior of the transmitter has served as the other. The insulated type is inherently a safer instrument to use, as the danger of shock is eliminated.

Desk Stands.—Following the introduction of the one-piece lug holder which added so much to the graceful appearance of the No. 20 type desk stand, a still further

improvement has been effected by the development of a single piece switch hook. This new switch hook is produced by unique punching operations which have been devised for the purpose. The new hook has also been instrumental in making a reduction in the weight of the stand.

Batteries.—A new battery—the Red Label Blue Bell—has been developed for general utility work. It is of the high initial amperage and low resistance type and adapted for use where there is not a constant drain on the current for extended periods of time. Its principal uses are for call bells, railway signaling systems, annunciators, toys, industrial gas engine work, and all slow speed ignition service.

An Inter-Comm-Phone Proposition

The progressive exchange manager should be on the lookout for opportunities to increase his business and make his company more successful. This progressive manager will be interested in the proposition made by the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., in regard to the sale of its inter-comm-phones. There is a ready market for this class of service and telephone companies should get their share of this business. The entire scheme is clearly outlined in a big two-color folder entitled "A Money Making Proposition Backed by an Able Concern." This folder explains in a simple manner the grand opening there is for independent telephone companies that will take up the proposition in an earnest manner. It also includes samples of the various pieces of literature which will be imprinted and furnished free to independent companies who intend going after this business.

Telephone and Telegraph at the Panama Exposition

A moving picture auditorium seating three hundred persons to be erected within the Palace of Liberal Arts, for the illustration of the interesting features of the telephone and telegraph service and for the demonstration of the long distance telephone, is to constitute a part of the elaborate and intensely interesting exhibit of the American Telephone and Telegraph company and the Western Union Telegraph company at the Panama-Pacific International Exposition.

The exterior of this building within a building will take the form of a huge curved map of the United States with the Atlantic and Pacific Oceans. The map will be transparent and illuminated from the back with moving lights showing the progress and development of the universal telephone and telegraph service. It is to be painted in beautiful colors giving the impression of a birdseye view of the country, with its rivers, lakes, mountains, fertile valleys and arid plains. The large cities will be picked out with jeweled lights, and the minor cities and towns in lights of lower value.

Within will be found one of the most interesting and highly educational exhibits of the entire exposition, comprising the original forms of telephones and transmitters, including the first telephone over which human speech was transmitted by Professor Alexander Graham Bell; the growth of the telephone and telegraph throughout the United States illustrated in five-year periods since 1880; the laying and splicing of submarine and underground cables; battery and power plants in operation; illustrations of simultaneous telephony and telegraphy over the same wire, showing methods of transmitting three telephone and eight telegraph messages simultaneously over four wires without interference; printing telegrams of various forms, including the short line printers and stock tickers; cable service, with methods of siphon recording; telegraph time service, showing methods of simultaneous transmission from Washington of time signals throughout the country and illustrations of the manufacture of cables, the installations of wires and the winding of magnets.

From the auditorium, visitors from the Atlantic Coast will be enabled to talk over a wire more than 3,000 miles in length, to their home town. The exhibit will be connected with 7,782,000 telephones in the United States, located in 70,000 places. During the ten months in which the Panama-Pacific International Exposition will remain open it is estimated that hundreds of thousands of visitors will inspect this remarkable exhibit, which will be of an especial educational value to the younger generation.

Electrose Scores in Everybody's Magazine

An article entitled "Better Business," by William Hard, in *Everybody's* for February, is a scathing arraignment of the United States Patent Office and its system. As an illustration of the delays and entanglements of patent litigation, the author has selected the Steinberger-Hewlett insulator case, previously mentioned in these pages. Louis Steinberger, who is president of the Electrose Manufacturing Company, has been prosecuting this infringement case for several years—and, it seems, the end is not yet.

Incidentally, the author pays a tribute to the material, Electrose, which is well worth repeating:

> Steinberger, who is a manufacturer as well as an inventor of insulators, makes all his insulators out of a material called "Electrose." He invented it. It is a very remarkable and very useful material, so much superior to glass and to porcelain that an electric current strong enough to cut straight through glass or porcelain will leave "Electrose" totally unharmed.
>
> We should like to know, as a nation, just how "Electrose" is made. We don't know now. Steinberger hasn't patented it. And he won't patent it.
>
> Steinberger patents the *shapes* of many of the insulators that come out of his factory. It is an insulator-*shape* that is now in controversy between him and Hewlett. But the stuff his insulators are made of is more important, a thousand times over, than all the shapes he ever devised. Steinberger won't patent that.
>
> He is afraid that the patent system would not protect him in it. He is afraid that the courts would not successfully prevent his competitors from using it, if they could once read about it in a patent describing it. So he keeps it to himself.
>
> "I wouldn't patent Electrose," says Steinberger, "unless I had a hundred thousand dollars to defend it with in the courts."

A Quarter Century of Strowger Patents

A quarter of a century has elapsed since the first patent application was made relating to the automatic telephone apparatus manufactured by the Automatic Electric Company of Chicago, for on March 12, 1889, A. B. Strowger asked for a patent covering the following device:

> In a system of telephone, telegraph or other electrical exchange, the combination with a series of wires leading to different stations in the system and having their ends insulated and held in a curved row, of a contact needle supported at the axis of the rows, mechanism for moving the needle from row to row, mechanisms for moving the needle along the row, magnets for actuating said mechanisms and wires leading from a substation for conducting electricity to energize the said magnets

Subsequent developments have greatly changed both

the appearance and the mechanical and electrical construction of the original device, but it is of interest that the first patent outlines very clearly some of the basic ideas embodied in the automatic switch of today. Among these are the arrangement of line contacts in a cylindrical form and the "up and around" motion of the wiper shaft.

It is also interesting to note that this first automatic patent antedates by some three years the device which forms the basis of the present manual common battery switchboard.

Exposition Ready for Exhibits by July

Intending exhibitors at the Panama-Pacific International Exposition will be much interested in the announcement made February 20 by President Charles C. Moore that the installation of exhibits may begin as early as July 1 of this year. This will enable the exhibitors to devote nine months to the preparation of their displays and will eliminate the annoyance and expense caused by the necessity of haste in preparation and installation.

The exposition is making no charge for space to exhibitors. Every effort is being made to assist the exhibitor and to reduce the expense incidental to exhibition. Arrangements have been made whereby manufacturers who need send less than carload lots may combine with other exhibitors through an accredited exposition agent and obtain the carload lot freight rate. The exhibit may be sent to a representative of the exposition at one of the three central branch stations at St. Louis, New York and Chicago. The agent will assemble exhibits to obtain the carload rate and consign directly to the exposition.

A railroad has been constructed upon the exposition grounds and will pass through all of the exhibit palaces. Every facility will thus be given exhibitors in unloading and reloading exhibits. When desired, exhibitors may combine so that but one attendant will be required for several exhibits.

The Automatic Monitor System

The Automatic Electric Company's monitor system apparatus consists of two parts—an automatic monitor switch and a standard automatic telephone with calling dial and a push button.

The monitor switch is mounted on an iron frame, with a terminal strip for 80 pairs attached. It is enclosed in a double cabinet of finished oak and is absolutely sound proof. The cabinet is 12 by 14 by 20 inches.

The monitoring station or telephone is a standard automatic desk telephone of the latest type with a push button in its base. This button when pressed opens a talking circuit with the operation under supervision.

Where more than one exchange is to be supervised a small push button box is furnished whereby the exchanges are selected.

The installation is very simple. Jumper pairs are run from each operator's position to the terminal strip. One cable pair is connected from the switch to the telephone. The storage battery current used by the exchange or dry batteries will operate the switch. Any number of monitoring stations can be attached to the switch. Blue prints and full instructions are furnished with each set. and more information may be had by writing to the Automatic Electric Company supply sales department, Chicago, Ill.

$80,000 for Benefits in One Year

H. B. Thayer, president of the Western Electric Company, in the course of his New Year's greeting to his fellow employes, expresses the company's satisfaction with the working of the employes' pension and insurance plan.

He states in part—"The Benefit Plan has been in full operation during the year. Sickness benefits have been paid to over 500 employes, and accident benefits to over 450. Fortunately, the accidents have as a rule been not of a serious nature, and have involved only temporary disability. There have been twelve cases of death of those coming within the provisions of the Plan, and there are 53 pensioners. The disbursements under the Plan for the first ten months of the year were over $80,000.

"In many cases these payments have come in times of great necessity and have been of great relief. In all cases they have given the help in time of trouble which the Company, through the Benefit Plan, has wanted to give."

Western Union Syndicate

Provision for the sale of the $29,657,200 Western Union Telegraph Company stock owned by the American Telephone and Telegraph Company is now being made. A large syndicate is being formed to underwrite the stock sale and probably will be headed by Kuhn, Loeb & Co. The price at which the shares are to be offered was not made known, but it was said the entire amount would be offered to stockholders of the Western Union, the purpose being to divest the Bell combination of all its interest in the telegraph company.

This step is being taken in accordance with the recent agreement between the telephone interests and the Department of Justice in Washington. About two months ago Theodore N. Vail, president of the Telephone Company, announced that agreement had been made because the government regarded the combination of the two companies as in violation of the Sherman Anti-Trust law.

After the telephone interests acquired the $29,657,200 Western Union shares in 1909 a large amount of money was spent in improving the properties of the Western Union. The company's total outstanding stock is $99,786,759, on which dividends are being paid at the rate of 3 per cent.

On the New York Stock Exchange Western Union shares were strong and unusually active, forecasting the negotiations for the underwriting of the telephone company's shares.

Branch Offices of Bureau of Commerce

Branch offices of the Government Bureau of Foreign and Domestic Commerce have been opened in New York, Chicago, New Orleans and San Francisco, where the bureau's publications, samples of foreign-made products, plans and specifications of construction work abroad, lists of foreign dealers in various lines, manuscript consular reports, and similar documents are available to interested individuals and firms. Reserved addresses in connection with "Foreign Trade Opportunities" published in the *Daily Consular and Trade Reports* may be obtained by application in letter form from these offices. It is suggested that firms in the districts served by these branch offices acquaint themselves with the ma-

terial available through them, as time may frequently be saved by application to the branch office instead of the Bureau at Washington. The addresses of the branch offices are as follows:

New York, room 315, United States Custom House.
Chicago, 629 Federal building.
New Orleans, Association of Commerce building.
San Francisco, 76-78 Appraisers' Stores building.

Labor Law Demands More Operators

A recent ruling of Ohio's attorney general with respect to a certain amendment by the last legislature of the labor law has caused the Stark Telephone Company at Canton to readjust the working hours of its telephone girls and to put on about fifteen new girls in addition to the sixty or sixty-five already employed.

The amendment to the law requires that no girl shall be worked more than fifty-four hours in one week and no more than six days in one week.

The telephone companies took exception to the law and held that it did not apply to them because it was almost impossible for them to regulate their schedules so as to comply with it. The opinion from the attorney general was not what was expected and that is why they are asking for more girls. Heretofore each girl has one whole day off every two weeks and the rest of the time has worked a long and a short day alternately.

Curious Accidents to Pole Line

Crashing like a series of discharges from the batterics of a dreadnought, twenty telephone poles of the Home Telephone Company, Portland, Ore., on Schuyler street from Union avenue to half a block beyond Twelfth street went down with a crash before daylight on the morning of February 6. Fortunately, the accident happened at 5 o'clock in the morning, when traffic practically was negligible, but residents along Schuyler street were scared out of their slumbers.

The poles went down at short intervals, perhaps not more than ten seconds apart, and poles of twelve or more inches diameter at the base make considerable noise when snapped off like twigs. Only a milk wagon and a scavenger and his team were in the "line of fire" and the drivers whipped up their horses and got out of the danger zone.

The cause of this unusual disaster was, according to officials of the Home Telephone Company, a defective anchor rod at the junction of Union avenue and Schuyler street, where the underground conduit ends and the wires for the Rose City district are carried to the poles.

A poor job was done by the blacksmith who welded the one-inch iron rod to the eye that held the supporting guy from the telephone pole. It is believed the poles were too light for the burden they had to bear. They were put up in 1905, when the line was built into that part of the city.

These poles carried four cables, each containing 150 pairs of wires, with a total weight of 1,200 wires.

When the anchor connection snapped the sudden strain on the first pole was more than it could carry and it went down, falling along the line of the curb. This pole brought down the next, the process continuing from pole to pole. For two blocks each pole fell along the parking, but near Grand avenue the falling poles were diverted by another cable across the street. Had they fallen the other way, some of the houses with their sleeping residents would have been crushed like eggshells.

The line carried enough wires for 600 telephones, although there are only between 200 and 300 in that district at present, and, strangely enough, only 25 telephones were put out of service. Company officials expect the service to be in good running order this evening, as all available men were rushed to the scene at daylight and a strong force of men worked all day replacing poles and restringing wires. The company estimates the damage at from $800 to $1,000.

As the poles crashed other wires were broken and the consequent short-circuiting sent forth a series of flashes which, accompanied by the roar, had all the indications to the newly awakened of a thunder storm. Residents of the neighborhood say that some of the poles rotted at the base, but company officials maintain they were in good condition and declare that even if they had been new poles and had not snapped under the strain they would have been pulled out of the ground.

One pole just beyond Twelfth street stood the strain. As a result, the rest of the line to Twenty-fourth street remained upright.

To Adjust Competitor's Rate

The United Home Telephone Company, operating in Mason, Oceana, Newaygo, Muskegon and Kent counties, Michigan, has made application to the State Railroad Commission for an order requiring the Michigan State Telephone Company to charge a 10-cent toll for three-minute calls in Mason county. This is the first time in the history of the commission that one telephone company has made a request to have the commission fix the rates of a competing company. It is set forth that the Michigan State Telephone Company gives free service out of the Ludington exchange to points inside Mason county. The United Home Telephone Company contends that the Michigan State should make a charge for this service.

The Oshkosh Manufacturing Company has appointed the Union Electric Company of Pittsburgh, Pa., as its Pittsburgh agent and has arranged with that company to carry a large and representative stock of construction tools and specialties on hand ready for prompt shipment. It has been arranged so that eastern jobbers can use this stock to advantage.

An extremely useful and handy vest pocket parcel post scale and zone finder is one of the unique pieces of publicity sent out by the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y. It consists of a sort of cardboard slide rule, which answers all parcel post questions at a glance.

The Paragon Sellers Company, western representative for the Electrose Manufacturing Company of Brooklyn, N. Y., has changed its name to the Paragon Electric Company, and its address to 9 South Clinton street, Chicago.

The different large jobbers all over the country are sending out color mailing folders descriptive of the new Oshkosh guy anchor. Detailed information can be had upon request to them.

Commission's Duty to Investors

Theodore Roosevelt says in an article published recently in *The Outlook:*

"It must be a cardinal principle in dealing with honestly built and wisely managed railways that the investor, the shareholder, is just as much entitled to protection as is the wage worker, the shipper or the representatives of the general public. Unless the investor finds that he is to get a fair return on his money, he will not invest, and in such case not only will no new railways be built, but existing railways will not be able to repair the waste, the wear and tear, to which they are subject, and will not be able to make needed improvements. All governmental action, whether by the legislature or the executive, should be conditioned upon keeping in view of this fact. The public can only be well served and labor well paid when the investor gets a fair return and is therefore willing and desirous to use further savings in the promotion of enterprise and development.

"The commission is no true servant of the public unless it unhesitatingly raises the rates when justice in the public interest requires such action, and unhesitatingly lowers the rates when this is the course which will ultimately best meet the public needs. This is merely part of the general doctrine of administrative control of big corporations. The control should not be hostile to the corporation; it should merely be hostile to any misconduct on the part of the corporation, and it should protect the corporation against misconduct aimed at it exactly as it protects others from misconduct committed by it. Unless the corporation makes money—that is, unless business men are prosperous—there will be no money to give in proper wages for the wage-worker, there will be no money with which to provide for his protection and to insure him against loss and damage, and no money wherewith to render proper service to the customers and to the public as a whole. Whether the reward comes in the way of big salary to the big manager who makes the business a success, or of dividends to the big or small man who invests money in it, the principle is the same. Our purpose is to see that there is a proper division of prosperity. But there can be no division unless the prosperity is there to divide. One of the methods by which the prosperity will certainly be abolished is to draw the line against size and efficiency instead of against misconduct. Another way to destroy it is to impose burdens, however necessary and proper, without facing the fact that someone must pay for the burdens, and that if the investor cannot pay for them and at the same time get a reasonable return on his investment, then either the business will close or the public must share the burden with the investor."

Thompson-Levering Specialties

The Thompson-Levering Company of Philadelphia has been commissioned to build all of the special insulation resistance and capacity testing apparatus for the New York Telephone Company. The portions of its toll testing apparatus which we were able to see indicated a very fine completed product.

The company has recently designed and put on the market an improved fault finder for locating faults, crosses and opens on telephone and telegraph lines, and for measuring conductor and insulation resistance. This is a modified form of circular slide-wire bridge, made in such manner as to give a very large number of steps which would be the equivalent of a very long slide wire.

The instrument is very compact and practically foolproof. The reverses are in units, tens and thousands, without any arithmetical calculation necessary and for this reason the instrument has found almost instant approval with the telephone trouble man, who in a great many cases is prone to decry the value of any instrument which requires intricate mathematical work after the results have been indicated.

The instrument is enclosed in a case of solid oak protected by heavy nickel-plated brass corner clips. A lock and key keeps the curious public away from the parts and the case is provided with a leather carrying handle. Rubber feet on the bottom and also on the back of the set are provided so that the case may be set down in any normal position without injuring it.

The galvanometer needs a word for itself as it has been especially designed to stand extreme usage. Through its simplicity and the way in which the pinions are mounted it is able to stand jars which would put any ordinary testing set out of commission.

This company also has put on the market an inductive fault finder which is used for locating wire troubles such as are found in telephone cables, conduits, etc. This is a very inexpensive but handy accessory to a telephone company which has cable to be maintained and where it is desired to locate trouble quickly and accurately.

The outfit is exceedingly simple and directions for its use are fastened to the inside lid of the set so that any one entirely unacquainted with the method of the use of this particular kind of apparatus can in a very few minutes make any test required. The price is within the range of any telephone company.

Illinois Independents in Convention

The ninth annual convention of the Illinois Independent Telephone Association assembled at the Leland Hotel, Springfield, on Tuesday, February 17. The convention opened at 10 o'clock when President James W. Barrett of Pekin introduced Mayor John S. Schnepp, who extended to the visitors the welcome of the city. President Barrett responded to the welcome, thanking the city for the reception tendered the visitors and emphasizing the fact that the present year has opened to the telephone men greater avenues of advance than ever before known.

Former Governor Richard Yates, now a member of the State Utilities Commission, made the principal address of the morning, in explaining to the telephone men the relation of the state utility law to them. Mr. Yates showed the men that the law would work for their benefit, and that for the good of the individual companies all difficulties under jurisdiction of the law should promptly be brought to the attention of the commission.

The afternoon session settled down to a general discussion of the effect of the public utilities law on the telephone companies. An address by Hon. O. F. Berry, former chairman of the railroad and warehouse commission, on the subject, "The Illinois Public Utilities Law and Its Application to Operating Telephone Companies," explained in a sufficient manner the relation of the law to the telephone industry.

A general discussion on legal points involved followed, and many questions on problems coming under the law were up for general consideration. B. B. Boynton, a local attorney, led the discussion.

The members voted to empower the executive committee to employ an able attorney to represent the companies of the association in all matters coming before the State Utilities Commission. Nearly 300 members were in attendance at the session in which the action was taken.

The day's program was completed with an address by Ed. D. Glandon, secretary of the Illinois-Indiana Clearing House, on "The Work of the Clearing House." Mr. Glandon emphasized the benefits of the body to the independent men.

At 7 o'clock the guests assembled for the banquet, held at the hotel, which ended the session.

Business of Indian Telegraph Department

On December 31, 1912, the number of telephone exchanges established by the telegraph department of India was 183, the total number of connections being 4,313, as against 179 exchanges and 3,485 connections on the corresponding date in the preceding year. In addition there were 663 non-exchange circuits with 1,248 officers, the figures for 1911 being 629 and 1,144, respectively. The subscriptions for telephone and similar services increased markedly during the calendar year 1912. The telephone lines at Delhi and Simbla were placed under ground. At the close of the year the number of telephone exchanges established by private telephone companies was 13 with 7,899 connections, compared with 14 exchanges and 6,876 connections at the close of 1911, and the royalties paid to the telegraph department by the companies during the year amounted to $24,180. The total reconstruction by the department during 1912 amounted to 505 miles of line and 1,906 miles of wire. There were also 523 miles of new line constructed during the year and 894 miles of wire erected.

The Indian Telegraph Department is a heavy purchaser of telegraph and telephone equipment. The value of the stock in stores at the beginning of the year was $1,632,000, and stores to the value of $1,093,666 were received during the year, of which $416,333 represented the value of stores imported from England ready for issue, $304,333 the value of stores transferred from the department workshops, and $64,333 was the cost of stores purchased in India. The value of the stock in hand on March 31, 1913, was $1,600,000. The total number of indents disposed of was 18,031. All indents for instruments were dealt with at Calcutta, the number during the past year being 3,072. The year's outturn from the workshops amounted to $341,666. Among the articles made at these workshops during the year were 95,780 galvanized tubes for telegraph poles, 1,700 tons of castings, consisting principally of parts of telegraph poles; 51 steel masts, ranging in height from 70 feet to 200 feet, for wireless stations and for supporting telegraph wires over rivers, and 5,890 instruments.

Music on the Line

Music boxes are making all kinds of trouble on the telephone party lines around Oshkosh, Wis. One man received a telegram calling him to Chicago hurriedly. He took down his receiver to inquire about the next train south and this is what he got: "When the Midnight Choo Choo Leaves for Alabam." A short time ago another party line victim wanted to call a doctor for his sick wife and was greeted with "Nearer My God to Thee." A woman user of a joint line wanted to give her milkman a special order for the next day. She drew "Down by the River, You and I." Another woman wanted to ask her husband if he would be home to supper at the usual hour and the music box replied for him "You'll Never Know."

Judging from the complaints that have been heard lately, the telephone concerts on party and single lines have developed into quite a nuisance. The owner of a music-making machine gets a new record, likes it very much and then calls his or her friends to the telephone to let them hear it at the other end of the line. Then a friend comes back with something like this: "Say, won't you put on the sextette from 'Lucia di Lammermoor,' or 'Silver Threads Among the Gold'?" and right away something is started that puts the line out of service for the joint user indefinitely.

The matter was presented to Manager A. C. Gallagher of the local exchange, who said:

"There is no doubt that people are becoming very thoughtless. I receive many complaints. However, there is nothing that I can do except to urge a discontinuance of the practice on the ground of fairness to other patrons."

Multiple Call Board for Schools

A multiple callboard, or a telephone switchboard by means of which one can press a button and be connected and able to speak to forty persons at once, is an innovation installed in connection with the intercommunicating telephone system at the Schenectady, N. Y., high school. When the new building was nearing completion, Principal E. R. Whitney, realizing the possibilities of such a board, which would enable him to make announcements to all the teachers in the building with one call, and knowing the principle involved to be simple, enlisted the services of City Electrician Kelton C. Radliff, with the result that the board, probably the only one of its kind, is now in satisfactory operation in the principal's office at the school, and gives daily proof of its value as a time-saver. Eighty-one telephones are in use in the high school building, but it was found that the transmission of sound was impaired when this number were connected together. Two separate calls are necessary, therefore, to reach every room in the building. By pressing a second button, or listening key, on the board, any one of the telephones called can reply.

South Dakota Convention

The South Dakota Independent Association convened at the Carpenter Hotel, Sioux Falls, February 11-12, for their eleventh annual convention. Manfold Savage, past president of the National Association, telephone men, delivered one of the principal addresses. Other speakers were: A. C. Cregg, general auditor for the Tri-State Telephone Company; D. M. Neill, president of the State Association of Commercial Clubs, and J. C. Kelsey, editor of a magazine devoted to the interests of telephone men.

About 50 members of the association attended besides the large number of representatives of telephone equipment companies. It was the most successful convention ever held.

Following is the list of officers elected: President, J. O. Steninger, Parker; vice-president, M. B. Ryan, Beresford; secretary-treasurer, A. S. Hall, Redfield; directors, J. Wilson, Groton; R. E. Cameron, White; C. B. Miller, Egan, and E. C. Kast of Milbank.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

Harry C. Slemin, for the last four years sales and advertising manager of the Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has resigned that position to accept that of advertising manager of the Yawman & Erbe Manufacturing Company, a large and well known manufacturer of filing systems. His new connection dates from March 1. Mr. Slemin joined the Stromberg-Carlson organization in 1904 at Chicago and went to Rochester with the new organization, in charge of the apparatus engineering department. He was soon placed in charge of the lead covered cable business of the company, which had grown to large proportions, and then of the foreign sales work. He became advertising manager in 1910. His first experience in telephone work was in the Chicago shops of the Western Electric Company in 1896. During eight years' service with that company he was promoted through several departments. During the last four years of his connection with the Stromberg-Carlson Company he did remarkable work in building up an efficient sales organization and furthering the interests of the company in the field. He has given telephone advertising a better name and originated numerous advertising and selling schemes now being used by many operating companies. He worked long and hard for the good of the telephone business, and became so well known in it that his departure from it will be a distinct loss. He has the wishes of all his old friends that he may be happy in his new work.

Charles L. Zahm, Detroit telephone engineer, who will represent the city in its fight against the Michigan State Telephone Company, has started work. Mr. Zahm filed a brief of his activities in the telephone field, in which he declares he has been engaged since 1890. Since 1896 Mr. Zahm has constructed telephone exchanges in many cities, representing big amounts of money invested. The city's expert has also installed plants in Detroit for the Independent Telephone Company, putting in four and one-half years in Detroit and southern Michigan.

John W. Callahan, general manager of the Illinois Telephone & Telegraph Company, died in Chicago February 12. He retired early in last December on account of the ill health to which he finally succumbed. He was born at Salem, Ohio, November 11, 1862. Until September, 1906, his life was spent in railroad work, but at that date he became general manager of the Illinois Tunnel Company, including its telephone property. He was a director of the National Independent Telephone Association for over a year, and was one of the organizers of the Telephone Service Association. He won the affection of all who knew him, and is sorely missed.

Arthur E. Wells has been appointed to succeed to the secretaryship of the Citizens Telephone Company at Grand Rapids, caused by the resignation of Ernest B. Fisher due to ill health.

C. M. Nininger is the new superintendent of the Cumberland Telephone Company at Memphis, Tennessee, succeeding F. L. Woodruff.

T. J. Cochrane, formerly assistant wire chief at the Ensley exchange of the Southern Bell Telephone Company at Alabama, will be succeeded by B. D. Coffee, of the Birmingham office.

J. W. Stickney will become the general manager in Indiana for the Central Telephone Company, succeeding L. N. Whitney, who has resigned to become superintendent of the New England Telephone & Telegraph Company, which is the Bell system in the New England states.

C. M. Darling, formerly commercial agent at Jackson, Michigan, for the Michigan State Telephone Company, becomes resident manager of the Lansing exchange.

Charles A. Stair, commercial superintendent of the Southern Bell Telephone Company at New Orleans, La., has been promoted to general manager in that city.

O. C. Snider, vice-president, treasurer and general manager of the Kansas City Home Telephone Company at Kansas City, Missouri ,tendered his resignation, to take effect March 1.

W. G. Pfingstay has been promoted from superintendent of the leased wire telegraph service in Atlanta, Ga., to the position of superintendent of all toll lines in the New Orleans district for the Southern Bell Telephone Company.

B. E. Sunny, president of the Chicago Telephone Company and of other Bell telephone companies, has been elected a member of the Chicago City & Connecting Railways collateral trust.

H. W. Day of Dallas, Tex., succeeds A. W. Woods as manager of the West Texas Telephone Company, at Billings.

S. A. Lane, district manager for the Southwestern Telephone & Telegraph Company, at Hannibal, Missouri, has been promoted to division commercial superintendent for the state of Arkansas, with headquarters at Little Rock, the change to be effective February 15.

D. F. Turnbull, district superintendent of the Southern Bell Telephone & Telegraph Company, at Birmingham, Alabama, was elected to the position of division superintendent, with offices at Atlanta, Georgia.

J. S. McGrann, recent manager of the Iowa Telephone Company at Iowa City, has been elected general manager, director and secretary-treasurer of the Union Telephone Company, with headquarters at Keosauqua.

The directors of the Brinfield Telephone Company of Illinois have elected Harlan Pemble as superintendent of office and lines to succeed H. B. Bowman, resigned.

E. B. Williamson, manager of the Central Union Telephone Company at Galena, Illinois, for the past three years, has resigned.

Wisconsin telephone companies that are purely mutual and which, instead of receiving tolls or rentals, confine the service to the members of the association, are not compelled to pay license fees to the state treasury, according to Attorney General Walter C. Owen.

NEWS FROM THE FIELD.

ARIZONA.

Work on the new telephone system for Chandler is progressing steadily. Several carloads of poles, cross-trees, cables, wire, insulators, etc., are already on the ground, and the exchange building, which will be of the bungalow type, will be erected soon. C. P. Getting, district manager of the Mountain States Telephone & Telegraph Company, of which the Candler system will be a part, states that the plant to be installed will have the usual capacity for towns of 10,000 inhabitants.

ARKANSAS.

The annual meeting of the Boone County Telephone Company stockholders was held at Harrison, February 3, and the following officers and directors were elected: W. H. Cecil, president; J. H. Fowler, vice-president; Mr. Emery, manager and secretary; and Claude Wilson, treasurer. The directors are: W. J. Moore, Dr. J. L. Simms, H. Hinchcliff of Little Rock, Charles Czech, A. C. Christeson and the officers named above.

The Hazen Telephone Company is preparing to move into new quarters over the Bank of Hazen. It is making extensive repairs on the lines. A larger switchboard will be installed.

The Pacific Telephone & Telegraph Company is planning the expenditure of $24,600 in the improvement of its Stockton central office. This sum of money will be expended entirely at the local central office for new cables, equipment and operators.

The Southwestern Home Telephone Company at San Francisco has filed an amended application for authority to refund promissory notes and to pledge bonds as collateral security therefor.

CALIFORNIA.

In the Imperial valley the Pacific Telephone Company will, during the early spring, expend about $35,000 in extension work. This is in addition to $65,000 recently spent.

The heavy windstorm January 2 played havoc with the poles of the Pacific Telephone and Telegraph Company in the Vine

Hill section. More than one dozen poles were thrown down by the wind and telephone communication with that section was almost impossible.

A project is under way to install a telephone line from the Pyramid Ranger Station in the mountains over the summit into Lake Valley. The matter has been taken up by Charles Cello with the Forestry Service and the owners of resorts along the state highway and on Lake Tahoe.

The Forestry Service will be asked to contribute the material for the construction of the line and the owners of the resorts the labor.

The Reedley Telephone Company has removed the wires from Main street and as soon as possible will remove the poles. New poles have been put in the alleys and all connections will be made at the rear instead of the front of buildings.

The Willard-Slater Company has been awarded the contract for the erection of the new building at 622 South Hill street, Los Angeles, as the main office for the Pacific Telephone & Telegraph Company. Cost estimated at $105,000.

Arrangements have been completed by the Pacific Telephone and Telegraph Company for the erection of a new $140,000 three-story fireproof building to be known as the Fruitvale office. This building will be located on the Foothill boulevard, near Fruitvale avenue, and is to be used as a branch exchange office.

A new telephone exchange building will be erected in the near future at Puente by the Home Telephone Company. The building and exchange will cost about $15,000.

COLORADO.

A new telephone line is being constructed from south of Vernon to Vernon.

GEORGIA.

The Southern Bell Telephone Company recently paid to the City of Atlanta $1,548.68 as a gross receipt tax on its business during the year 1914.

IDAHO.

The annual meeting of the stockholders of the North Idaho Telephone Company was held February 2 at Wallace. Walter C. Clark of Kellogg was elected president; Herman J. Rossi, vice-president; C. W. Gibbs, secretary; and P. P. Weber, treasurer. The directors are: J. C. Glahe of Burke, J. W. Hutchins of Mullan, Walter C. Clark, C. W. Gibbs, Stanley A. Easton, Herman J. Rossi and James F. McCarthy.

J. I. Henton, manager of the Mountain State Telephone Company, will install a new plant at Glenns Ferry next spring, including new wires, poles and equipment.

ILLINOIS.

A recent telephone meeting resulted in the decision of the Crescent Telephone Company to purchase a location for a permanent switchboard at Hillsdale. J. E. Wilson of Port Byron was chosen local representative.

The Bardolph-Bushnell Telephone Company of Bushnell has chosen officers for the year as follows: President A. K. Bricker; vice-president, Jerry Fuhr; secretary, Claude Pontifex; treasurer, George Stambaugh; collectors, George Stambaugh, Kay Cowperthwaite; central committee, John Bossong, George Stambaugh, George Long, Bushnell; H. K. Ogden, A. L. Winter, Kay Cowperthwaite, Bardolph.

The Fairview farmers' telephone companies that planned the building of a trunk line into Canton have changed the program. Decision was reached January 21 to build the trunk line to Fiatt, only seven miles distant, and connect there with the toll line of the Home Telephone Company of Canton. Connection is made also at Fiattt with the ten farmers' lines which enter there. Construction will begin at once.

Grangers' Mutual Telephone Company, Gibson City; dissolved.

The Leaf River and Egan Mutual Telephone Company met January 12 and elected the following officers for the ensuing year: Dr. J. T. Kretsinger, president; David Kretsinger, secretary; George G. Myers, treasurer.

The telephone properties of Coon Brothers, in Fisher, were sold recently to the Fisher Telephone Company for $8,500. Coon Brothers retained the old switchboard. A new Kellogg switchboard of double the capacity of the old one is being installed.

Staunton Telephone Company, Staunton; capital stock increased from $2,500 to $25,000.

A new telephone exchange for the city hall at Moline has been installed.

The Citizens' Telephone Company met January 6 and elected the following officers: President, J. A. Toohill; vice-president and secretary, R. L. Swearingen; treasurer, Richard Craft; directors, F. E. Hubbell, W. F. Swearingen, James Toohill.

The annual meeting of the stockholders of the Scottsburg Telephone Company was held Tuesday, January 6, and directors were elected as follows: Clem Paull, Harry Lantz, W. E. Hoffman, Chas. Stark, M. F. Mummert and Lewis Noper. The directors elected these officers: W. E. Spicer, president; Harry Lantz, secretary-treasurer.

Moweaqua Telephone Company, Moweaqua; capital, $30,000. Incorporators: P. L. Drew, S. S. Clapper, R. E. Clapper.

The City Automatic Home Telephone Company, Rock Island; capital stock increased from $1,000 to $2,000,000.

Sangamon County Telephone Company, Pawnee; capital stock increased from $20,000 to $35,000.

Through a deal consummated recently the Illinois Telephone Company has purchased the lines, toll line equipment and instruments of the Ebenezer Telephone Company, which was owned by C. L. Reid and W. G. Hadden. The line consisted of about 37 instruments and brings the total number of instruments of the Jacksonville exchange of the Illinois company to 2,038.

Coles County Telephone and Telegraph Company, Mattoon; capital stock increased from $100,000 to $150,000.

Citizens' Telephone Company, of Lawrence county, Lawrence; capital stock increased from $80,000 to $100,000.

Macedonia Telephone Company, Macedonia; capital stock, $2,500; telephone business; H. C. Vise, J. M. Lee, Lewis W. Fisher.

The Crescent Telephone Company held their annual election at Port Byron Jan. 5, and elected the following officers: George McMurphy, president; J. M. Martin, vice-president; A. A. Matthews, secretary; E. L. Hanson, treasurer.

The Sadorus Telephone Company went out of business, following a meeting in the DeLong bank January 9. The company sold its only remaining possession, a small lot and concrete building, to the DeLong brothers, two of the stockholders. The consideration was $200.

The Harwood Telephone Company, of Gifford, met January 3 and elected Henry Eiler president, W. T. Pierce secretary, and J. W. Remley treasurer.

The annual meeting of the Cuba, Independence and Canton Telephone Company, of Canton, was held at the home of J. A. Miller, January 5, at which time the following officers were elected:

President, J. A. Miller; vice-president, J. L. Fitzgerald; secretary and treasurer, S. L. Jameson; director for 3 years, Dan Henderson; member committee on switchboard, J. L. Fitzgerald.

INDIANA.

After trying for the past two years to get into the town of Churubusco the Farmers Mutual Telephone Company of Columbia City, has been successful and the lines are expected to be in operating order at an early date.

Citizens Mutual Telephone Company of Hillsdale; capital $1,000; telephone business; directors, Orville Hutson, O. P. M. Ponton, L. O. Ingram and others.

Plans are being prepared for the Merchants Mutual Telephone Company's new warehouse to be erected on the former Wilcox property, 118 East Eighth street, Michigan City.

The stockholders of the Avilla Mutual Telephone Company held a meeting January 13 at Music hall, and elected the following directors: H. A. Moore, Adam Weimer, Wm. Berkes, F. E. Kelham, Frank Bell, V. C. Simon, Harry Stewart and Edward Gump. The directors then elected the following officers: Thomas Kelham, president; H. A. Moore, vice-president; F. E. Kelham, secretary, and Joseph Kraus, treasurer.

The Merchants and Farmers' Telephone Company, of Hillsboro, held a meeting at the opera house January 3.

The following directors were elected: Dave Myer, Lewis Starnes, Sr., Virgil Frazier, George Hesler, William Epperson, Valmar McKnight, James Laird, J. D. Linville, and Dr. A. D. McKey.

People's Telephone Company, Bryant; capital stock, $8,000; to operate a telephone exchange; directors, W. H. Elberson, James Rupel, Peter L. Treece.

The Cumberland Telephone and Telegraph Company is planning to improve its rural service in Clark county. It has spent $7,000 during the last six months and is making estimates for improvements to cost $36,000 during 1914. New poles will be erected on the line to New Washington, a distance of thirty miles.

The Home Telephone & Telegraph Company, of Fort Wayne, has decided to remodel the southside office and exchange building on Masterson avenue, and, according to announcement made by general manager William L. Moellering, work will be started in the very near future.

IOWA.

Improvements contemplated by the Iowa Telephone Company in Muscatine will call for an expenditure of $25,000. Extensive overhead as well as underground work is in prospect and the improvement of the local service is anticipated. One of the most notable features of the work will be the extension of three circuits from Muscatine to Iowa City for the purpose of establishing direct connections with points in the interior of the state. The work will be commenced during the early spring.

At a meeting of the stockholders of the Farmers Mutual Telephone Company of Jessup, recently, the following officers and directors were elected for the year: President and general manager, Alvin Oliver; vice-president, Elmer Stevenson; secretary and treasurer, C. L. Bright; directors, Alvin Oliver, W. C. Kenney, C. C. Rienche, A. D. Mount, William Brown, Elmer Stevenson and Fred Orth.

The Bell telephone station at Coin has been changed from the Chapman residence to the Miller drug store, which makes it more convenient for the public.

The Robins Telephone Association held its annual meeting February 2, re-electing the old officers for the year. Action was taken looking forward to the building of a blank line between Robins and Alburnett and Robins and Toddville.

The new switchboard for the improved telephone service at Albia has arrived and will be installed as rapidly as possible.

The Marcy Telephone Company, at Ogden, recently installed a new switchboard in their office. It is one of the very latest on the market, and will afford splendid accommodations to their many patrons.

At the annual meeting of the Lone Rock Telephone Company, held January 1, at the home of Charles Kaiser in Lime Creek township, the following officers were elected: J. R. Willey, president; Harry McArthur, vice-president; C. A. Kaiser, secretary and treasurer; Ed Chamberlain, line man; directors, Frank E. Witmar, Wm. C. Cahill and Edward Chamberlain.

The Switch Board Directors of the Grandview Telephone Company, at Muscatine, held their annual meeting Saturday, December 27, and elected the following officers for the ensuing year: President, Geo. Young; vice-president, J. M. Buster; secretary and treasurer, E. A. Haas; executive committee, J. Robt. Schaffer, J. H. Buster and Geo. Young.

With the laying of seven blocks of telephone conduit on upper Broadway, Council Bluffs, practically completed, the force employed in the work is being shifted to South Sixth street, where similar conduits are to be laid from Ninth to Sixteenth avenues.

The Iowa Telephone Company has begun extensive rebuilding of its lines in East Des Moines. January 6 application was made to J. H. Sweeney, outside wire inspector, for a permit to erect 143 new poles. According to the recent electrical ordinance the companies are required to rebuild one-third of their old lines each year.

A deal was closed recently whereby J. E. Meyers, of Sidney, became owner of the local telephone system at Randolph.

Lorimor Mutual elephone Company, Lorimer, Union county. Capital stock, $3,000; C. M. C. Barley, president.

The Welton Mutual Telephone Company held their annual meeting for the election of officers and the following were elected for the coming year: President, Carl Brooks; vice-president, Bernie Maltas; secretary, L. L. Loofboro, and treasurer, M. C. Mudge.

At a meeting of the stockholders of the Independent Telephone Company, of Council Bluffs, January 12, directors for the year 1914 were elected, and these directors a few moments later selected officers for the year as follows:

President, G. M. Dodge, Council Bluffs; vice-president, E. H. Merriam, Council Bluffs; secretary, C. D. Parmalee, Omaha; treasurer, T. G. Turner, Council Bluffs; auditor, W. A. Pixley, Omaha; counsel, C. G. Saunders, Council Bluffs, and executive committee, C. E. Hall, G. H. Pratt, and W. A. Pixley, all of Omaha.

The Blakeville Farmers' Mutual Telephone Company has filed amended articles of incorporation whereby the name of the concern is changed to Dunkerton Mutual Telephone Company. Headquarters of the company is in Dunkerton.

At a meeting of the Eldridge Mutual Telephone Company, held January 12, officers and directors were elected for the ensuing year. Plans were discussed for the improvement of the service and it was decided to install a new switchboard. The following officers were named: President, John T. Hansen; vice-president, August H. Lamp; secretary, N. H. Calderwood; treasurer, Albert C. Oetzmann; directors, Fred Kranbeck, Rudolph Koch, Fred Hauer, Frank Keppy, Jr., and William Moeller.

The Farmers and Merchants Telephone Company, of Akron, recently opened its new building to the public and formally placed the new switchboard and equipment in operatiion. The opening was called a carnation house warming, and over 1,000 of these flowers were presented to women subscribers, while the men were royally entertained by the management.

At the annual meeting of Mediapolis Mutual Telephone Company held January 6, the following persons were elected as a board of directors: A. E. Miller, F. M. Brown, Joe Mehaffy, John Stucker, W. O. Riddle and I. R. Caruthers.

About ten miles of telephone poles have been set southeast of Prescott for the new Prescott Co-operative Telephone system.

At the annual meeting of the Farmers' Mutual Telephone Company in Sac City the following officers were elected: President, James Comstock; vice-president, Fred Pellersels; secretary, F. R. Hierschel; treasurer, E. N. Baily. The executive committee comprises William Pitsick, Fred Pellersels and J. M. Deibert. In addition to these officers the board of directors includes George Hein, L. M. Barnhill, W. Rhoads, and L. Mann.

It is definitely settled that the International Telephone Meter Company will make its permanent home in Fort Dodge, as word reached the city that E. H. Martin had refused all other offers for the location of the plant.

KANSAS.

At their annual meeting recently the stockholders of the Moundridge Telephone Company of McPherson endorsed the recommendation of the board of directors that as soon as sufficient funds are on hand they will put up a brick building and convert the present system into a metallic system.

Lone Tree Telephone Company, Galva, $500; by A. J. Miller, F. M. Domsch, M. Schroff, F. H. Suffield, Alva Flook, Lyman Munn, F. D. Munn, F. D. Holmes, Robert McMurry, of Galva; N. Ritz, A. F. Tinsley, O. M. Blain, Ben Thomas, I. J. Austin, A. L. Peterson, T. I. Tinsley, F. J. Hamilton, G. A. Lewis, J. Whitright, of Canton.

The Suburban Telephone Company at Tangonoxie held its annual election of officers February 3. The following were elected: President, William Freienmuth; vice-president, W. C. Phenicie; secretary and treasurer, Foster Laming; directors, William Freienmuth, F. W. Martin, Jacob Kemler, William C. Phenicie, Foster Laming.

The directors of the McPherson Telephone Company, on recommendation of the president, J. E. Wright, and manager L. C. Criner, have authorized the manager to pay to all employes of the company who are in the service of the company December 31, 1914, 5 per cent of their yearly salaries in addition to the regular pay.

Coffey County Telephone Company, Waverly; decrease capital stock from $25,000 to $2,035.

The stockholders of the Utica Telephone Company held their annual meeting and elected officers for the ensuing year as follows: C. Evel, president; J. D. Wheatcroft, vice-president; A. B. Beatty, secretary-treasurer.

The annual meeting of the stockholders of the Salina Telephone Company was held, and all of the members of the old board of directors and officers were reelected for another year. The officers are as follows: J. O. Wilson, president; John Anderson, vice-president; Clarence Wilson, secretary and treasurer, and D. A. Van Trine, general manager.

KENTUCKY.

A. W. Davis, manager of the Home Telephone Company at Hickman, has completed arrangements for a new line to Cayce, ten miles away, and is planning a line to Fulton, twenty miles distant.

A recent fire in the town of Hampton, Livingstone county, spread and destroyed seven buildings, including the Cumberland Telephone plant.

Barren & Monroe County Telephone Company, Glasgow; capital, $3,500; incorporators, W. H. Taylor, C. B. Miller and L. C. Griffiths.

The Cumberland Telephone Company and the Home Telephone Company of Owensboro suffered greatly from a sleet and snow storm February 13. Telephone wires loaded with ice broke and fell over heavily charged electric wires, rendering traffic dangerous. Manager Jacobs of the Cumberland Company places the loss at about $15,000.

Henderson has suffered the worst wreckage of telephone lines in the history of the exchange. Seventeen poles were down in one stretch on the Louisville line between Henderson and Owensboro.

Changes are contemplated by the Cumberland Telephone and Telegraph Company which will make Louisville headquarters for

a separate division instead of being auxiliary to Atlanta, as at present is the case.

The work will be divided between two new companies, and such towns as Bowling Green, Middlesboro, Paducah and Corbin, now in the Nashville division, will be transferred to this point. Only the approval of the directors of the companies is required to make the contemplated changes effective.

The Vanceburg Telephone Company, Vanceburg; awarded articles increasing amount of liability.

Eagle Telephone Company, Sadieville; capital, $945. Incorporators: George Penn, M. D. Sanford, C. T. Smith and John Kitchen.

LOUISIANA.

Plans for enlarging the offices and equipment of the Cumberland Telephone & Telegraph Company in New Orleans, in the execution of which between $1,500,000 and $2,000,000 is to be spent, were made known through the board of trade. It is the intention of the company to improve the site now occupied, together with that recently purchased, by additions to the present building and the erection of an annex which shall be equipped with all conveniences for facilitating the telephone service in this city.

MICHIGAN.

The Michigan State Telephone Company will expend $15,000 in Marshall for inside and outside exchange construction, according to word received by Manager Austin Elwood. The plans for the changes include the removal of the poles from State street and the rerouting of the exchange cables and toll lines; the opening of a new office at the corner of Jefferson and State streets, in which will be placed a complete new switchboard and the necessary apparatus, also the reconstruction of farm lines.

The annual business meeting and dinner of the Grand Ledge Telephone Company was held February 3. Sixty stockholders and employes of the company were present. Officers and directors were re-elected as follows: President, Clark Smith; vice-president, J. W. Ewing; secretary, treasurer and general manager, G. M. Every; directors, John Brunger, Harry Tanner, C. A. Brunger, W. H. Oding, Claude Barton and A. Munn.

The directors of the Saugatuck and Ganges Telephone Company met with the Glenn Mutual directors recently and made arrangements that both companies connect, being free exchange for subscribers on both lines. A division of territory was decided upon; that the Saugatuck & Ganges move their switchboard from Glenn and the Mutual move theirs from Fennville. Each company agrees not to solicit subscribers in the other's territory.

At the meeting of the Shiawassee Mutual Telephone Company at Bancroft, the following officers were elected: President, Norton H. Blake; vice-president, Roger Scribner; secretary, Luceine Scribner; secretary, B. D. Love; general manager, A. W. Skinner; director, one year, Jacob Gulick; director, two years, Carl Stone; auditor, one year, James Atherton; auditor, two years, Jessee Alchin.

A new line testing apparatus is being installed for the Michigan State Telephone Company at St. Clair by George Mercer, of Detroit.

Within a few months the Soo will be equipped with one of the best and most up-to-date telephone systems in the country. All during the summer months and up to the present time the Michigan State Company has been engaged in the work, which will cost about $40,000. Practically all of the outside construction is completed and almost all lines are now installed in cables.

Manager Price of the Consolidated Telephone Company recently announced that Snover would have a telephone exchange in a short time.

At the annual meeting of the Bronson Mutual Telephone Company, of Jackson, the following officers were elected: President, Ambrose Bushnell; vice-president, Frank Martin; treasurer, L. P. Hansen; directors, John Shaffmaster, John Shurtz, L. T. Sackett and Wm. Smith.

At a mass meeting of more than 1,000 citizens to hear the report of the committee on the telephone grievance against the Citizens' Telephone Company, it was unanimously voted to establish a municipal telephone system in Traverse City and eliminate the services of both the Bell and Citizens Companies.

Through a reorganization of the districts of the Michigan State Telephone Company, which took effect January 10, Kalamazoo has been made the telephone headquarters for all of southwestern Michigan. Offices for the new district will be located in the local telephone building on South Burdick street, in charge of E. P. Platt.

Formerly Michigan was divided into five administrative districts with Kalamazoo in the Grand Rapids district, which comprised the western half of the lower peninsula. Under the new system there are twelve districts, each in charge of a district manager.

The common council has passed a resolution citing that the franchise heretofore granted the Union Telephone Company, of Midland, has expired, and it orders the company to remove its poles from the city streets. This action is said to have been caused by dissatisfaction over service.

At the annual meeting of the directors of the Fayette Rural Telephone Company the following officers wehe reelected for the ensuing year: President, Chas. T. Kimball; secretary, Robert Carter; treasurer, Eugene C. Adams. The directors voted to accept the location submitted by the signers a few weeks ago. This location is in the Blois building on Main street, Jonesville.

A meeting of the stockholders of the Morenci Telephone Company was held at the First National bank, January 7, and an election of directors of the company for the ensuing year took place, Lyman A. Kennedy, D. H. Osgood, Ambrose Combs, C. E. Cottrell and Arthur Turner being elected members of the board. The new directors then held a meeting and elected officers with the following result:

President and manager, D. H. Osgood; treasurer, Arthur Turner; secretary and treasurer, C. E. Smith.

The Riverside Telephone Company was organized January 12 with George Councell as president, Leo Cave, vice-president, and Frank Eisenlohr, secretary. The line will be in operation in a few weeks.

The Hamilton-Franklin Telephone Company has been organized with 30 subscribers. The plan includes a line to Gladwin. Directors are J. E. Ladd, George Sears, Chris Iutzi, G. W. Bailey, Jr., and Harry Pomeroy. L. G. Sly is secretary. Bids are asked for poles to construct the line.

At the second annual meeting of the Clinton Telephone Company the following officers were elected: President, Leslie G. Brown, St. Johns; vice-president, W. T. Plowman, Bengal; secretary and treasurer, Arthur L. Tripp, St. Johns. Directors elected for three years are Henry Lindsay, Greenbush; D. R. Sturgis, Bengal, and W. L. Rosekrans, Bingham. Charles Travis, of Bengal, was elected to fill the vacancy for a two-years' term.

MINNESOTA.

The Mesaba Telephone Company has definitely decided to erect a building for an office and warehouse on the lots purchased some time ago on the corner of Spruce street and Wyoming avenue, Virginia, according to Fred E. Lister of Duluth, district manager of the company. Engineers are already at work on the plans for the building, which will be a two-story brick and modern. It will probably be six or seven months before the new building will be ready for the use of the local exchange.

Directors of the Farmers' Cooperative Telephone Company at Hinckley have decided to increase the capital stock from $10,000 to $25,000.

MINNESOTA.

Twelve hundred feet of telephone cable has been strung by the Aitkin-Deerwood Telephone Company, at Crosby. The cable will replace the many wires now strung on the poles in alleys.

One mile of telephone line has been put up by the Grave Lake Telephone Company, a corporation formed by farmers residing 10 miles east of Brainerd. The company plans to connect with Brainerd by stringing its wires on the poles of the Oak Lawn Telephone Company. Officers of the Grave Lake organization are William Meade, president, and Charles Galler, treasurer.

The farmers living northwest of Deer river have organized the Northwestern Minnesota Telephone Company. Frank Russell has been chosen president of the new concern; Alvin Hill secretary, and James Coffee, treasurer. The poles are already erected for a distance of seven miles out of Deer River and the equipment for the exchange will arrive in a few days.

Stockholders in the Tri-County Co-operative Telephone Company, of Cass Lake, held their annual meeting and elected the following officers for the ensuing year: President, Oscar Suther; vice-president, Louis Bowman; secretary, O. F. Lindstrom; director, J. P. Schmitt.

MISSOURI.

The Miller Township Telephone Company's lines have recently been extended to the crossing on Bay de Charles at Munger's switch.

At the annual meeting of the Johnson County Home Telephone stockholders, held at the office of the company, at Warrensburg, officers were elected for the year as follows: W. J. Mayes, president; Nels Abraham, vice-president; James H.

Lampkin, secretary; H. C. Houston, general superintendent; J. Wesley Stone, Harry T. Clark, W. C. Kapp, C. J. Rucker, C. T. Malcomson, A. M. Craig, directors.

John O'Daniel has traded the Bethel Telephone Exchange to Roy Nicol, of the Hayward and Nicol real estate firm, for a farm in Tiger Fork township.

At the annual election of officers of the Andrew County Mutual Telephone Company, held January 14, the following officers were elected: B. E. Carpenter, president; W. E. West, vice-president; O. V. Sells, secretary-treasurer; J. H. White and Frank Kneal, directors.

The West Division street Telephone Company line, carrying a metallic line to the county almshouse near Nichols and to Ellwood, has been completed.

The total cost of the new line was $306.95, of which one-third is borne by Greene county for a private line to the almshouse.

MONTANA.

Great Falls Automatic Telephone Company; authorized capitalization, $500,000; issued for cash, $104,290; for property, $250,000; liabilities, $303,592.13; T. S. Lane, president; F. W. Buff, vice-president; John F. Davies, secretary; John MacGinniss, treasurer.

The Meagher County Telephone Company announced the sale, early in the year, of their toll lines between Harlowton and Judith Gap and White Sulphur Springs, as well as the local exchange at these points. William Burghardt of Fessenden, N. D., purchased the Judith Gap exchange, while that at the county seat went to Otto C. Schulz of Brodhead, Wis. The company retains its local exchange and will install at once a new switchboard, as well as other extensive improvements.

The Riverside Telephone Company, of Billings, has extended its lines into Worden.

The farmers living east of Judith Gap will build a telephone line to run from Great Falls to upper Careless creek, a distance of about 17 miles. There will be about 20 ranch houses connected to this line, and it will be built early in the spring.

R. F. Dutcher, who has charge of the farmers' telephone on the north bench, is erecting poles and will have the line finished into Three Forks in a few days.

The stockholders of the farmers' telephone line on the north bench met at the home of R. F. Dutcher January 3 and elected officers: R. F. Dutcher, president; Grover Watson, vice-president; Dick Young, treasurer; Virtus Lund and Alonzo Gastineau were elected to act with these officers as directors and draw up a constitution and by-laws preparatory to incorporating, after which they will join either the main line of the Independent or Bell telephone of Three Forks.

It was learned recently that the Mountain States Telephone and Telegraph Company has decided to unite the Bell and Independent systems in Butte, in order to do away with the dual system now in vogue, but that the change probably will not be put into operation immediately, for the reason that the plan will take some little time to work out.

NEBRASKA.

The Independent Telephone Company's new building at Red Cloud will soon be commenced.

The Nebraska Telephone Company of Omaha re-elected all officers at the annual meeting February 12 and declared a 6 per cent dividend. Those re-elected are: C. E. Yost, president; C. E. Hall, C. W. Lyman and E. M. Morsman, Sr., vice-presidents; J. W. Christie, secretary and treasurer; J. R. McDonald, assistant treasurer; W. A. Pixley, general auditor; E. M. Morsman, Jr., counsel.

The Nebraska Telephone Company announces the purchase of two lots at Thirtieth street and Fowler avenue, Omaha, where in the spring it will build a new telephone exchange. No name has as yet been given to this exchange.

The new plant is to cost about $100,000 and will handle the phones in the territory between the present Webster exchange, Florence and Benson.

At the meeting of the Farmers' Telephone Company, of Fremont, held at the court house January 6, the following officers were elected for the ensuing year: Fred Howe, president; T. H. Fowler, secretary; C. L. Kelly, treasurer; L. Williams, Lee Chapin, Chas. Lennerman, John Drenguis, H. Spath and H. Tank, directors.

By the transfer recently of its Crete exchange to the Crete Telephone Company, a locally-owned concern, the Lincoln Telephone & Telegraph Company concluded a long series of negotiations with the various independent companies in the South Platte, where dual exchanges existed, by which that system of furnishing service to communities was ended. The purchase price was $32,870, the same figure paid by the Lincoln Company to the Bell when it bought out the latter at Crete. Part of it will be paid in cash and part in preferred stock.

The Lincoln Telephone Company has received permission from the railway commission to charge an additional fee of 25 cents for each desk telephone instrument on farm lines. This has been the charge in the Lincoln zone, but it is now extended to any territory where the company has farm lines. The company is alleged to be desirous of discouraging the use of desk phones on farm lines because they are more liable to be broken and get out of repair and a trip to the country to make repairs is not profitable to the company.

The Valparaiso Telephone Company are remodeling the building which they recently purchased from E. J. Cassel, where they will move the office and switch board of the company.

The members of the Keystone Telephone Company held their annual business meeting at Keystone January 12.

NEW YORK.

Considerable damage was done by a recent storm to the Bell Telephone Company lines in Albion. It is reported that there were forty poles down and the wires a mass of wreckage.

At 10 o'clock January 24, exactly on the stroke of the hour, the long distance switchboard which had been in service for the American Telephone and Telegraph Company for fourteen years in the telephone building in Dey street, New York, was cut out and the entirel ong distance telephone traffic of the greater city and nearby towns was shifted to the new switchboard in the company's new Walker-Lispenard building. The new switchboard is the largest toll board in the world, taking two years to build and install it. The present number of long distance calls sent out from New York in a day is about 6,400, while there are about 6,000 incoming calls each day. The operating force in the new office is made up of 335 operators, of whom 225 are on duty between 8 a. m. and 5 p. m.

At the annual meeting of the Geneva Telephone Company, officers were elected as follows: President, B. G. Hubbell, of Buffalo; vice-president, J. B. Anderson; secretary, J. W. Mellen; directors, D. J. VanAuken, H. A. Wheat, J. E. Brown, S. F. Dey, O. J. C. Rose, C. S. Burrall, A. G. Lewis.

Papers of incorporation of the Conklin Telephone Company, with $400 capitalization, were filed recently in the county clerk's office. The company is to operate lines through the towns of Kirkwood and Conklin, acting as connecting links with outside lines. The directors and stockholders are James L. Englebert, Eugene C. Edmister, Martin B. Tompkins, Ethelbert W. Jones, Frank D. Vosbury, William S. Beebe and Henry L. Clark.

At a meeting of the Himrod Telephone Company officers were elected as follows: President, Dr. C. M. Van Dyke; vice-president, Fred A. Rapalee; secretary, A. T. Beardslee; treasurer, U. G. Watkins; directors for three years, C. M. Van Dyke, A. T. Beardslee; for four years, Alexander Richardson.

NORTH CAROLINA.

The Hendersonville office of the Asheville Telephone & Telegraph Company announces a number of extensions in rural lines at an early date. R. L. Lowndes has made arrangements with the telephone company to extend his farmer's lines connections in and around Flat Rock.

NORTH DAKOTA.

The Dakota Northwestern Telephone Company of Williston will install a telephone exchange at Alexander in the spring. The town has been canvassed, and there will be over sixty subscribers with the opening of the exchange.

The Westhope Telephone Company of Fargo is planning the installation of an electric light plant during the coming summer.

The Dickey County Mutual Telephone Company held their annual meeting at the home of J. G. Schultz, of Ellendale, and the following were elected as officers for one year: President, Adam Schweitz; treasurer, Jacob Lay; directors, J. G. Schultz and Jacob Rutsche; secretary, Gott Wendland.

At Bremen, C. W. Saylor has been given permission by the county board to construct a telephone system.

A new switchboard has been installed in the Gladstone hotel at Jamestown.

The Union Telephone Company, of Fargo, recently sold 10 exchange stations to the Northwestern Telephone Company, Wimbleton being one of the ten. Other exchanges transferred were Dickey, Marion, Leeds, York, Minnewaukan, Sanborn, Adrain and Esmond.

As the Northwestern covers a much larger territory than the Central Union it is apparent that the service will be greatly improved by the change.

The annual meeting of the Traill County Telephone Company was held in Hillsboro. The year's business was gone over and a goodly balance was found to be on the right side of the ledger. A sinking fund of $1,600 was laid aside and an 8 per cent dividend declared. The following directors were chosen: John E. Paulson, C. C. Dalrymple, P. S. Peterson, A. Knudson, John Carmody, N. D. Nelson, A. G. Foogman. Following the stockholders' meeting the directors met and chose the following officers: President, John E. Paulson; vice-president, C. C. Dalrymple; secretary and treasurer, A. G. Foogman; manager, A. T. Nicklawsky.

At Spiritwood, the Winfield Township Farmers' club has purchased a telephone line and has incorporated the Winfield Rural Telephone Company. Improvements will be made.

OHIO.

Barren & Monroe County Telephone Company, Glasgow; capital, $3,500; incorporators, W. E. Taylor, C. B. Miller and L. C. Griffiths.

The stockholders of the Bergholz Telephone Company held their annual meeting at Bergholz and the old directorate, consisting of A. G. McBane, T. E. George, Ernest Favri, J. B. VanFossen, R. B. Thompson, J. Q. Adams and Marion F. Crofkey, was re-elected.

The Chester Telephone Company, Chester, telephone lines in Geauga county, $15,000; G. C. Quigley, C. H. Bond, H. O. Jacobs, H. S. Mills and Franklin Battles.

The Swanton Home Telephone Company, Swanton; increase from $20,000 to $40,000.

The Columbiana County Telephone exchange at Dungannon is being moved from the John Hogan property to the Pollock Brothers store.

The Langemeyer Rural Telephone Company, Washington township, Van Wert county, owning and operating telephone line; John Reindel, John T. Gerdeman, Joseph A. Recker, Lee H. Trautman and Frank S. Langemeyer.

The Newark Telephone Company has announced that work will start shortly on a new telephone exchange at St. Louisville. The new plant is to be ready for operation June 1, and will provide free service between Newark and subscribers on the St. Louisville system.

The new multiple switch board to be installed in the addition now being built by the Bell Telephone Company in West Rayen avenue, Youngstown, has been ordered, and it is expected to be ready for service by June. The new board will take care of 4,000 additional subscribers, which with the 5,600-board now in use will bring the total to 9,600. When completed the local station will be modern and up-to-date in every particular. All appliances and equipment are of the latest design, and better service is promised throughout.

The Washington Telephone Company, Marietta, $300,000; F. L. Alexander, B. L. Bullman, G. J. Lund, H. H. Miller, W. S. Plumer.

The Jefferson Telephone Company was organized December 31, at Steubenville, to take over all the property of the National Telephone Company in the county, which was sold at receiver's sale. P. R. Lewis of Steubenville is president and Edgar Charnock of Wheeling is secretary and treasurer.

The Troy Telephone Company, Troy; decrease from $75,000 to $60,000.

On its own initiative, the state public utilities commission has made an investigation of the Putnam Telephone Company of Liepsic, and ordered a complete overhauling of the plant and lines within ninety days. The experts reported that the service was poor and inadequate owing to a run-down and neglected plant.

Lecta Citizens' Mutual Telephone Company, Lecta; owning and operating a telephone company. Incorporators, Tony Hidora and others.

The Greenville Home Telephone Company is contemplating buying the Bloomer Home Telephone Company of Bloomer, Miami county, for $3,575. The two companies filed a joint petition with the state public utilities commission January 12 asking permission to make the purchase.

The Jefferson Telephone Company, Steubenville, $400,000; P. P. Lewis, E. E. Francy, W. R. Burgoyne, J. A. Heinlein and Fred Neininger.

The Athens County Home Telephone Company, Athens; increase from $100,000 to $150,000.

At the annual meeting of the Farmers' Mutual Telephone Company of Benton Ridge it was decided that the monthly rate for telephones would remain at 60 cents. The following officers were elected: President, M. H. Kirtland; vice-president, J. C. Miller; secretary, B. C. Wittenmeyer.

When Adams street between Summit and Ashland avenue Toledo, is repaved next summer, telephone, telegraph and electric light wires along the thoroughfare will be taken from poles and run through underground conduits, if recommendations of the public improvements committee are endorsed by council. Universal placing of all wires underground, along streets that are newly improved, is the policy of the council committee as expressed at its first session recently.

The Farmers' Mutual Telephone Company of Deshler held its annual election of officers, choosing P. W. Tuessing, president; C. C. Harmon, secretary; W. Hoke, lineman, and Mrs. Elsie Jamieson, head operator.

At the annual meeting of the stockholders of the Lewisburg Telephone Company the following directors were re-elected for the ensuing year: Wynn Hoerner, S. N. Keithley, H. P. Smith, E. J. Ozias, M. H. Markley and J. C. Rice, all of Lewisburg, and Judge Elam Fisher of Eaton. The officers chosen are E. J. Ozias for president, H. P. Smith for treasurer and Wynn Hoerner for secretary.

PENNSYLVANIA.

The Pennsylvania Telephone Company will take possession of the property, 28 Church street, Reading, by April 1. The company some time ago took the residence adjoining for its supply office. The two buildings will be remodeled and combined into one structure adapted for their special use.

The telephone line from Elverson to Morgantown has been completed.

The Lehigh Valley Railroad telephone exchange which has been at Coxton for the past number of years has been changed to the freight house at North Pittston.

At the annual meeting of the Farmers' Independent Telephone Company of Indiana county, held at Marion Center, the following officers were elected: President, W. W. Hopkins of East Mahoning township; vice-president, Harry Short of Rayne township; secretary, S. J. McManus of Marion Center; treasurer, John F. Glasser of Rayne township.

The Pomeroy Construction Company have been awarded the contract for the alterations to the telephone exchange building, southeast corner Seventeenth and Diamond streets, Philadelphia, for the Bell Telephone Company. John T. Windrim, architect.

The Bell Telephone Company is running a 100-pair cable between Allentown and Bethlehem.

It is reported the Keystone Telephone Company will endeavor to get a franchise in Palmyra.

At the annual meeting of the Intercourse Telephone & Telegraph Company of Marietta, February 6, the following officers were elected: President, John M. Beam; secretary, William R. Knox; treasurer, Martin D. Kurtz; vice-president, Chester A. Diller; directors, John Leaman, Augustus Rodgers, P. B. Buckwalter; solicitor, C. A. Diller.

Wampum subscribers of the Bell Telephone Company will be given new directories of the town and district subscribers shortly.

At a meeting of the board of directors of the Somerset Telephone Company, affiliated with the Johnstown Telephone Company, held at Somerset, the following officers were chosen: President, Fred W. Biesecker of Somerset; vice-president, Edwin D. Schade of Johnstown; secretary-treasurer, Josiah Swank of Somerset; executive committee, Charles Griffith and Edwin D. Schade, Johnstown, and Josiah Swank, Somerset.

The Bell Telephone Company has established a new central office in the Lyons building, at Forest City, serving fifty subscribers, to replace their system under which they were serving twelve subscribers from their Carbondale central office.

Lizard Creek Rural Telephone Company. Wehr, Schuylkill county, $5,000.

The representative from the department of labor and industry at Harrisburg who visited Morgantown made an examination of the Conestoga exchange and found conditions which did not conform to the law. Thirty days was given in which to remedy the objectionable condition. The room was declared to be unsanitary and has only one window.

Announcement has been made by the Bell Telephone Company that work on big improvements at Scranton will be commenced within a short time. Besides laying 570 feet of underground cable they will supplant many of their open wires with almost 7,000 feet of aerial cables. This will entail an expenditure of nearly $5,000.

The Bell Telephone Company will run a line through McKeansburg to Orwigsburg.

The stockholders of the Pine Bank, Jollytown and Bluff Telephone Company held their yearly meeting January 10, at which meeting officers and directors for the following year were

elected: William H. Coen of Pine Bank, president; Roy Clovis of Jollytown, secretary; Matthias Meighen, Pine Bank, treasurer; directors, William H. Coen, Jacob Simpson, Roy Clovis, Matthias Meighen, J. A. Carpenter, R. E. L. Carpenter, J. C. Huffman, William Porter and J. P. Eakin.

F. W. Van Loon & Pomeroy Construction Company are estimating on plans and specifications for alterations to the telephone building at Seventeenth and Diamond streets, Philadelphia, for the Bell Telephone Company. John T. Windrim, architect.

SOUTH CAROLINA.

J. T. Thomason, secretary, treasurer and manager of the Lancaster Telephone Company, is having extensive improvements made in the company's plant under the direction of W. H. Sargent. The latest devices are being installed. The old route frames are to be cut out and a new model switchboard substituted.

SOUTH DAKOTA.

The installation of the automatic telephone exchange in Watertown was completed February 1.

At the annual meeting of the Custer Mutual Telephone Company held January 21, the following officers were elected: S. M. Booth, president; Percy H. Helm, secretary; T. W. Delicate, treasurer. The directors held over.

TENNESSEE.

The Citizens' Telephone Company plans to make an addition to its exchange building at Columbia. The company has purchased the lot adjoining its building and fronting twenty feet on Garden street. Work on the new buildings will begin at an early date. This company is also reconstructing many of its lines in the county and putting in several new country exchanges.

The Citizens' Telephone Company is putting in a trunk line from Mt. Pleasant to Hampshire, and will have it completed and connected with the exchange there in a short time.

TEXAS.

The Lone Elm Farm & Telephone Company of Perry, capital $1,000. Incorporators, Peter Ewry, John W. Ruth, John Ritthaler, Perry.

The Southwestern Telegraph & Telephone Company is making a substantial increase in its equipment at the local exchange in Stamford. Work is now in progress which will add 150 new instruments, giving the town more than 800 subscribers.

Tomball-Spring Telephone Company, Tomball; capital stock, $15,000; incorporators, J. J. Trichel, E. F. Trichel, W. A. Gilbraith.

The Long Point Telephone Company of Brenham has elected the following board of directors to serve the ensuing year: F. A. Boemer, C. F. Kieke, Henry Schlottmann, Henry Nienast, G. Jaroyowski. The finance committee is comprised of E. H. Kelm, Ben Boere and C. Steinkamp.

The West Texas Telephone Company will begin making improvements to its plant at Ballinger that will cost $20,000. The company will install what is known as the central energy or flash light system. Twelve thousand feet of new cable will be laid and a new switchboard installed and also new automatic phones will take the place of the present system. The work will be completed by March 1.

The Southwestern Telephone & Telegraph Company has a large force doing extensive work on the system at Jefferson, putting in cables in the residential sections and new white cedar posts in the alleys to replace the posts now on the streets.

That Brownwood is enjoying a remarkable growth is evidenced by the fact that the local telephone company has installed more than 100 new phones within the past three months.

The San Marcos Telephone Company has installed a large gong on the north side of the courthouse which is rung by the telephone operator from the switchboard whenever a fire alarm is sent in.

The Starr Telephone Company, organized at Rio Grande City, with a capital stock of $5,000, has closed a contract with Mr. Lubion, representative of the Western Electric Construction Company, for the construction of a line from Roma to Samfordyce and the work will begin within two weeks. This new line will afford additional facilities for communication from this part of the Rio Grande valley and connect with telegraph and other telephone companies at Samfordyce, the nearest railroad station from this place.

VIRGINIA.

Victoria will soon have an electric power plant and a telephone system, applications for charters for both companies having been made.

Beginning February 11 the Bluefield Telephone Company will operate a twenty-four hour telephone service in Pocahontas.

The Norfolk & Carolina Telephone & Telegraph Company of Virginia. L. S. Blades, president; J. T. McCabe, vice-president; C. W. Grice, secretary and treasurer, all of Elizabeth City, N. C.; capital stock, $25,000. Principal office, Norfolk. Object, to operate telephone line from the North Carolina state line through Norfolk county and into the city of Norfolk.

The Chesapeake & Potomac Telephone Company of Norfolk, was authorized by the board of control January 5, to install a conduit at York and Botetourt streets and to renew a number of poles in various parts of the city.

WASHINGTON.

South Hannaford Farmers' Telephone Company, Centralia; capital, none; incorporators, Isaac M. Pollock, Fred Buchanan and others.

At a meeting of the Uniontown Telephone Company February 10 the following directors were elected: Lambert Taufen, Swen Swenson and C. W. Schlee.

At a recent meeting of the Manila Telephone Company of Espanola, it was decided to finish rebuilding the line with new cedar posts, and to string another wire, making a double wire system. Work is to start in spring. The following officers were elected: President, J. T. Griffith; secretary, R. W. Dudley; treasurer, Henry Tank; lineman, G. P. Peterson.

The annual meeting of the Farmers' Independent Telephone Company of Waterville was held January 2. The former directors, J. S. Withrow, C. F. Will, I. B. Lovejoy, Henry Tolle and George Hensel, were re-elected. It was reported that the company now has 388 telephones and that the plant is worth $16,000. The expense of operation was $5,069. New lines are needed to the Orondo fruit region and the Mansfield section.

The Pacific Telephone & Telegraph Company has installed a double circuit between Cle Elum and Spokane.

What will probably be the last meeting of the stockholders of the Enterprise Telephone Company will be held in the offices of that corporation in Wheeling, January 27. The company recently sold their holdings and this meeting has been called for the purpose of settling accounts, etc. The company will probably give up their charter after this meeting.

The traction company is having a new trunk telephone line constructed between its local dispatchers' offices at Fairmont, and the Chiefton sub-station. The new trunk line is being strung with strong copper wire, which is said to be of sufficient size to withstand the heaviest snow or sleet storm.

WEST VIRGINIA.

The heaviest telephone cable ever put up along the streets of Warwood is now being placed on the poles of the Bell Telephone Company by Foreman O. C. Zimmerman. The cable encloses 600 wires and supplies patrons from the Top mill northward to Radcliffe's.

WISCONSIN.

A first-class long distance line is to be built from Eagle River to Monico, to connect with the Bell Company at that point, and Three Lakes is organizing a local system to connect with this new long distance line. It is expected that everything will be in shape for the construction of the line, to commence as soon as the frost is out of the ground.

St. Croix Telephone Company is planning to erect a modern telephone exchange at New Richmond.

The application of the St. Croix Farmers' Mutual Telephone Company at Madison to extend its line into Grantsburg, where the Tri-State Telephone Company of Minneapolis is operating, was refused by the railroad commission.

Directors of the Wisconsin Telephone Company, at their quartely meeting, approved construction work in Milwaukee, Madison, Eau Claire, Beloit and other exchanges to the amount of $300,000. This will consist of underground conduits and other extensions, but no new buildings. The directors present were B. E. Sunny nd Alonzo Burt, Chicago; C. J. French, Boston, and O. C. Fuller, O. H. Falk, E. A. Uhrig and J. O. Frank, Milwaukee.

At a meeting of the Rhinelander Telephone Company, the following were elected directors. Arthur Taylor, W. E. Brown, F. T. Coon, Dr. E. H. Keith and Charles F. Barnes. The officers were elected as follows: president, Arthur Taylor; vice-president, F. T. Coon; treasurer, M. H. Raymond; secretary, Geo. F. Mahoney and H. W. McWayne.

The new officers of the Auburndale Telephone Company, elected recently, are: President, J. T. Holland; treasurer and manager, N. M. Berg; secretary, R. A. Connor. The directors are: J. C. Kieffer and A. J. Frederich of Auburndale, D. McVicar of Vesper and James Mercer of Arpin.